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TRANSACTIONS

OF THE

Royal Caledonian Horticultural Society

WITH WHICH IS INCORPORATED THE

Scottish Horticultural Association

VOL. VI.—PART 1

(SESSION 1936)

MAURICE G. KIDD, B.L., W.S.
EDITOR

EDINBURGH
1937

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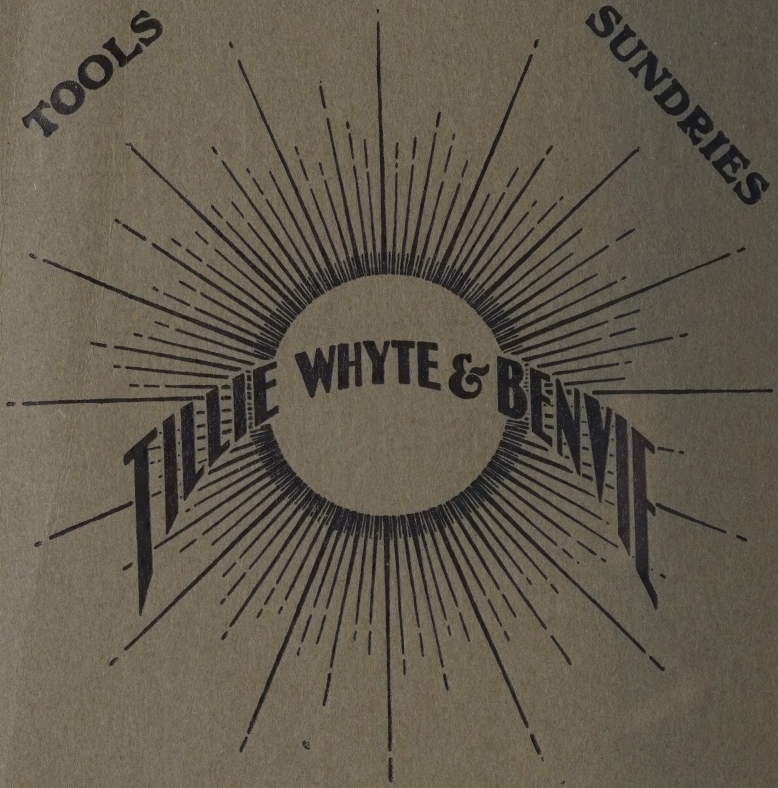

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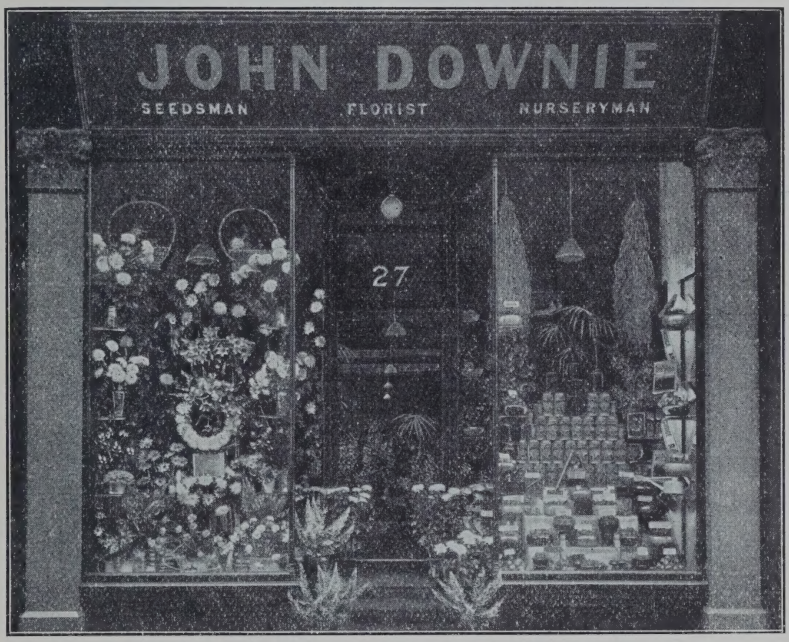

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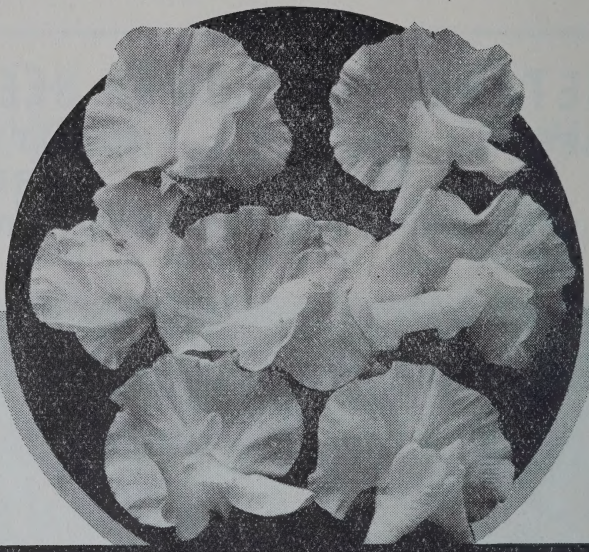

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EDINBURGH

1937

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TRANSACTIONS

OF THE

Royal Caledonian Horticultural Society

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SESSION 1936

1.—PRESIDENTIAL ADDRESS: NEW GARDENS FOR OLD.[1]

By WILLIAM FIFE, Edinburgh.

GARDENING to-day in its many varied forms, either as a means of livelihood, as a hobby, or as a source of recreation and enjoyment, is practised to a more or less degree by every civilised nation in the world, and even the uncivilised have their primitive methods, too. To lovers of gardens and growers of plants, whose numbers to-day in Great Britain alone can be reckoned in millions, there is a wonderful fascination in taking a look at the past and reviewing the circumstances under which horticulture, as we now know it, has developed throughout the ages. Such a review embraces many countries, for do we not find when we look at the history of some of our most popular flowers how ancient they are. We have only to take the Queen of Flowers, the rose, as an example. We learn that its existence was known of many centuries B.C., and that it has been a favourite flower from time immemorial among the civilised nations of Europe and Asia, but not in the beautiful forms and colours which attract so much attention at the present time.

The earliest history of gardening is wrapped in mystery, and accordingly there are no authentic records other than those handed down by tradition. From these it is known that in the

[1] Address delivered at the Annual General Meeting, 8th January 1936.

early primitive settlements of many tribes were to be found enclosures for their cattle, and to supply these with food, the ground had to be cultivated, the seed sown and the crop harvested, the cultivation being done with a tool somewhat resembling a present-day pick, a crude method compared with that now employed.

The supposed origin of a garden makes interesting reading, as described by Loudon in his famous *Encyclopaedia of Gardening*. He writes as follows : " The first vegetable production which attracted man's attention as an article of food is supposed to have been the fruit of some tree, and the idea of removing such a tree to some spot and enclosing and cultivating it near his habitation, is thought to be abundantly natural to man, and to have first given rise to gardens. All the writers of antiquity agree in putting the fig at the head of the fruit trees that were first cultivated. The vine is the next in order, the fruit of which serves not only for food, like that of the fig, but also for drink." Seakale and asparagus were known to the Greeks from the earliest ages. Loudon goes on to say, " Bundles of flowers covered the tables of the Greeks, and were worn during repasts, because the plants of which they consisted were supposed to possess the virtue of preserving the wearer from the fumes of wine, of refreshing the thinking faculty, preserving the purity of ideas and the gaiety of the spirits."

From the examination of the early records of Ancient Egypt, it is clearly manifest that the inhabitants had a great love for plants and gardens. Recent explorations in that country have done much to confirm that love of gardening, and confirmation is supplied by their garden plants, their songs of flowers and by their fondness of trees, as illustrated in their culture of the palm, acacia and sycamore, which are referred to in biblical history. Jewish, Phoenician, Babylonian or Assyrian, Persian and Grecian gardens, were all famous in the centuries B.C., but time does not permit going into detail regarding these.

Coming to a later date we find that the old Roman Empire, until its fall in the fifth century, was famous for its interest in gardening, an interest which has been carried down through the centuries to the present time. Did we not when at school read in our Latin books of the gardens of Caesar ? The two great Roman poets, Horace and Virgil, tell something of the

gardens of those far-off days, and from the writings of that era it must be concluded that they were works of magnificence and great grandeur. Other famous Roman gardens were those of Lucullus, Sallust, Pliny, the Roman Emperors and the Vatican.

Horticulture carried on through the ages, always making progress, and much activity took place in many countries, principally Italy, Holland, France and Germany.

There is no doubt that horticulture to-day owes a great deal in many ways to these enthusiasts of the early days, and that not a few of our pre-war gardens had features derived from these old masters. Our country was evidently backward in the very early times, because in the fourth century, Strabo writes: "The people of Britain are generally ignorant of cultivating gardens as well as of other parts of agriculture." With the invasion of the Romans, however, gardening was introduced into this country, and with them they brought many plants for trial. Under the instruction of the Roman officials, the British people cultivated these, and by so doing it was found that a large proportion of these introductions were suitable for the climate of Britain. Excavations of houses of the time of the Roman occupation have proved that they were skilful growers, exercised great taste in the layout of their gardens, and were excellent at the cultivation of vegetables.

Compared with England, Scotland was not so far forward, but if it was slower to begin it made rapid strides with such advantage to Scottish gardeners that they became world-famous for their skill and ability in the handling of plants. Gardening in Scotland, no doubt, got a fillip from the French weavers, because Loudon writes: "A taste for florists' flowers, it is conjectured, was first introduced into Scotland by the French weavers, who took refuge in that country in the seventeenth century and were established in a row of houses called Picardy Row in the suburbs of Edinburgh. It seems to have spread with the apprentices of these men to Dunfermline, Glasgow, Paisley and other places." It is interesting to note that about the same time, approximately 1680, the original Botanic Garden of Edinburgh was founded.

It is thus seen that immigrants to these islands at various times had a decided influence on the tastes of the people, and it is noted that more specialisation in flowers took place. Under

the same influences, market gardening received a great impetus. And so as time passed, progress went on, with Italy and France taking a prominent part. Many of the finest gardens in the British Isles have been developed by ideas gathered from these folks. Many believe that Hampton Court was a result of this influence, and to-day it is still one of our best known and most famous gardens.

Scotland was not behind in this progress, and with the ideas gathered from many countries, horticulture went forward and reached a marvellous state of perfection, as demonstrated by the most excellent cultivation of florists' flowers during the last century, and as seen in the wonderful and famous gardens of pre-war days, as exemplified in Dalkeith Palace and Hopetoun House gardens, to mention only two. These gardens only reached this pinnacle of perfection by the working of previous generations of gardeners, men who loved their calling and who were ever ready to grasp new ideas, men through whose labours and great enthusiasm the typical British garden came into being. No rapid modern methods can ever produce the wonderful gardens for which our islands have been and still are the envy of the world. Only hard work and loving care are responsible for the great stretches of verdant lawns which melt into beds and borders of glowing blossoms, and which are such a delight to the eye.

Scottish gardeners have played a prominent part in this great work, and over the border the suspicion and jealousy which their skill aroused 120 years ago makes interesting reading. I do not apologise for again quoting Loudon, as he describes it so aptly in his entrancing book under the heading of the " Gardener's Charter." The contents of this Charter are as follows : About the middle of the last century, Lee, Gordon, Russel and Malcolm, all Scottish gardeners, commenced their nurseries at Hammersmith, Mile-End, Lewisham and Kennington. Their success excited the jealousy of the established commercial gardeners, who, between 1760 and 1770, held several meetings and entered into resolutions not to employ young men from the north. These resolutions were not long adhered to ; but a tract, entitled " Adam Armed," published by this association at the time, shows the extent of what they intended. From this tract, it appears that James I.

had granted a charter to certain persons inhabiting within London and six miles of it, who were capable to educate and instruct young men in the art of gardening. This charter was granted in the third year of this king's reign, and renewed in the fourteenth ; but in the tract alluded to, it is stated never to have been put in force and not to be sufficiently extensive ; and therefore it is proposed that a charter be granted to extend over the whole kingdom, to prevent mere labourers and other unqualified persons from assuming the profession of gardeners, and thereby doing " great injury to the nobility's and gentry's gardens and plantations " as well as to proprietors who let ground to such as " undertake to furnish the market with eatables." Only a certain number of gardeners were to be licensed to take apprentices, and of these the number was to be limited, etc. This attempt at monopoly of skill does not appear to have met with serious attention, and all that resulted from the association, as far as we have been able to learn (from a gardener, Duncan, upwards of 90 years of age), was the partial exclusion, for a year or two, of young Scotsmen from a few of the nurseries and gentlemen's gardens near town, which were managed by Englishmen.

The passing of time has made great changes, and while many think these changes are for the better, it is sad to think that such wonderful gardens as Dalkeith Palace have gone, through the great burden of post-war taxation, and what excellent training facilities such places provided for the youths of those days. But time marches on, and the old must give place to the new. One might almost say that Henry Cockburn, afterwards Lord Cockburn, in his book entitled *Memorials of His Time*, 1779-1830, a most interesting chronicle of the events of those years, had forecasted the changes which have taken place in the last twenty-five years, as the following extract from his book shows. It runs thus : " Two still subsisting institutions arose in 1809—the Horticultural Society and the Commercial Bank. The Horticultural Society was chiefly the work of Patrick Neill, a printer ; a useful citizen, a most intelligent florist, author of an excellent *Horticultural Tour in Flanders*, and of the article ' Gardening ' in the *Encyclopaedia Britannica*, and of various other kindred works. The exotics in his little acre-garden at Canonmills put many a grander

establishment to the blush. He was also an archaeologist, which made him one of the few defenders of our architectural relics. This Horticultural Society was one of the first buds of that extraordinary and delightful burst of floral taste which has since poured such a botanical magnificence over our great places and such varied and attainable beauty round our cottages. It is not in our public establishments, or in our great private collections, that its chief triumph is to be looked for, but in the moderate place, the villa, and especially in the poor man's garden ; in the prevalence of the little flower societies ; its interest as a subject of common conversation, and the cheap but beautiful and learned practical works that are to be found in the houses of the humblest of people. I cannot doubt its proving a great civiliser. In innocence, purity, and simplicity, the florist—not the scientific botanist, but the florist of his own little borders—is the only rival of the angler."

Developments of recent years have brought about radical changes, and I would venture to say that to-day horticulture only takes second place to wireless in popularity. The greater knowledge of gardening by the masses of our people is a most striking feature of recent horticultural developments, and every day the hold which gardening has on all sections of the community is ever increasing. It is interesting to note the keen interest these new gardeners take in their plots and the enthusiasm displayed by many. Even the owner of the tiniest plot seems to find a great sense of joy in possession. A large percentage might be classed as novices, because they never at any time previously had any opportunity of handling a gardening tool. In innumerable cases they have transferred from congested areas where conditions offered no inducement to cultivation, owing to the fact that with lack of sun and circulation of air, plant life could not survive. Environment to-day is considered a powerful factor in uplifting people to better things and better ideas. In their new surroundings these people are surely finding new pleasures and happiness in the healthy and profitable pastime of gardening, and it is the duty of this Society to lend a helping hand to these people in every possible way to enable them to enjoy to the full their new-found pleasures, and to encourage them to produce gardens which add beauty to our cities and to our countryside.

Many influences have been at work to bring this about, and one of the most important is that so many new houses have been erected in recent years, and in most cases with a useful garden. The spirit of rivalry in these new communities has had a marked effect, and nowhere more so than in our own city. I have watched the Corporation Housing Schemes with much interest, and it is amazing how the general standard has improved in a comparatively short time. It is good to have real enthusiasm for one's hobby, but on occasion it is apt to run riot. A number of years ago, I remember a house which was ready for occupation and the garden was laid out with tarmacadam paths. Judge of my astonishment one morning when I observed a heap of tarmacadam on the street at this man's abode. On investigation it was found that the new occupant had removed every path, even the one to the back door, and where this should have been were planted rows of cabbages in orderly fashion, so that he literally stepped from his back door into his favourite cabbage patch.

Many other factors have contributed to the greater popularity of gardening.

There has been in recent years an ever-increasing number of Horticultural Societies and Flower Shows concerned with horticulture generally, and in some cases with the cultivation of particular flowers. These have had a marked effect in stimulating interest and healthy rivalry between members.

Greater attention and taste in lay-out has been exercised by municipal and public bodies in the arrangement of gardens under their charge. In our own city we have excellent examples in Princes Street Gardens and also in the Rose Garden at Saughton. The gardens of the London parks are now a most outstanding and interesting feature of the parks, as well as being instructive and educative to the public who visit them in thousands throughout the season. The Queen Mary Rose Garden at Regent's Park is well worth a visit during the flowering season, and in the same park a fine collection of flowering shrubs has now been planted. Daffodils in Hyde Park in particular in spring, and dahlias in the autumn in various London parks, also draw great crowds, and the interest shown is reflected in the number of pencils and notebooks to be seen in use. The same is taking place in other parts of the country,

and must have an influence in making the people garden-minded.

When such a tremendous interest is shown by the present generation, it is to be hoped that those in authority will give, in their town-planning schemes, due consideration to providing gardens and open spaces within easy access of their citizens, where recreation may be indulged in, not forgetting pleasant retreats and sheltered spots for those who favour less strenuous amusement.

Another factor which has also helped to maintain interest has been the constant flow of new introductions, many of which are easily grown to perfection and which have been collected in far-off lands by our intrepid plant hunters. At home and abroad hybridists have been busy and have given us many fine new plants, and at the same time many others have put in endless work in improving strains of vegetable and flower seeds with such excellent results that it is doubtful if our forefathers would, in many cases, recognise the improved forms of many of the flowers which adorn our gardens to-day, and without doubt quite a number would be condemned under the standard of the florists' flowers of their time.

In addition we have gardening papers which impart knowledge and are ever ready to give advice with gardening problems. The importance of gardening and its popularity have also been recognised by the lay press, and to be up with the times there now appears in most newspapers weekly articles on current topics. It has to be recorded that the majority of these gardening articles reach a much higher standard to-day than they did a year or two ago.

The opening of so many of the finest gardens in Great Britain has also done much to give ideas and to improve gardening knowledge, thus guiding the people in their efforts to have finer gardens, and the real enthusiasts to their goal—a good garden.

I have already mentioned wireless, and I believe that broadcasting plays a much larger part in making gardening so popular than many of us realise. Most of the speakers are men of the highest standing in their particular spheres, and give thoroughly sound and reliable advice. That these talks are widely listened to is beyond doubt. Many of you will remember Mr Tom

Hay's talk on new plants some little time ago. At the close of the talk, it was announced that a list giving the names of the plants could be had on application. The British Broadcasting Corporation had prepared 600 copies, but there were 10,000 applications, thereby proving the importance of broadcast talks.

Simplicity in his scheme is the keynote of the cottager, and is not the cottage garden a picture in thousands of cases ? " Good gardens advertise their presence even through the tallest and thickest boundary hedge. They are a direct incitement to gate-crashers," runs an extract from *My Garden*. They often arrest our attention as we pass along the road. These picturesque gardens are to be found in the most unexpected places, as I discovered in a recent tour of the Western Highlands. It is wonderful what can be done with an old-fashioned rose or two and a few hollyhocks and pansies, with a tree or two in the background. Simple, you say. Yes, but beautiful. We all admire the large gardens, with their rock gardens, woodland gardens, bog gardens, and imposing herbaceous borders, but they seldom possess anything like the charm of simplicity that many cottage gardens do.

It may, therefore, be said that, widely as the act of gardening was practised throughout the ages in the different countries to which I referred earlier, at no time and in no country has a greater effort been made to beautify his surroundings with Nature's gifts or to improve the fruits of the earth than that made by the people who make up the population of the British Isles at the present time. J. B. Priestley sums up this love of gardening in the following words taken from his *English Journey* : " There is this to be said about the English people, give them a foot or two of earth and they will grow flowers in it ; they do not willingly let go of the country as foreign people do—once they have settled in a town, they are all gardeners, perhaps country gentlemen at heart."

2.—MODERN DAHLIAS.[1]

By D. A. Torrance, Busby.

The dahlia was introduced into Europe nearly a century and a half ago, but it is practically only in post-war times that it has become the popular flower that it is to-day. It might be said that Coltness Gem revolutionised the dahlia, principally owing to its long period of blooming, and adaptability for small gardens. Then the advent of the Garden Cactus, with their free-blooming habit, good stem, and early blooms also added to the already increasing popularity. How very different it was, thirty or forty years ago, when Cactus, Pompons and Shows were the popular types, a large proportion of which were late blooming. It was no uncommon occurrence, at that time, for the plants to be cut down by an early frost at the commencement of their blooming period. It is the early blooming sorts, together with the varying habits of the different types, that have made the dahlia the largest-grown flower of the present time.

Lifting and Storing.

It is advisable to delay lifting the tubers for a few days after the plants have been cut down by frost. This allows the tubers to firm up to some extent, which greatly assists in their lasting properties when stored. I find that losses are usually heavier if the roots are lifted right away, and I allow a week or ten days to elapse before commencing to lift. Lifting should be done very carefully, as broken tubers must be avoided or a certain amount of vitality is lost; the soil should be loosened all round the root before an attempt is made to lift it,[1] and a spade should never on any account be used, always a fork.

The correct method of storing the tubers is to keep them dry, but not too dry, otherwise they will shrivel, and that must be avoided. Various methods are used, but in any case they must be stored in a frost-proof place. Six to nine inches of stem should be left, and my method is to invert the tubers until that stem has dried off, so that the sap will not interfere with the "eyes," which are found at the junction of the stem

[1] Paper read at the monthly meeting on 7th April 1936.

and the tuber. By inverting them, the sap runs off into the bed of ashes or fine soil they are resting on. After the stems are perfectly dry they are put right side up, and looked over regularly every week or ten days. Any that show signs of shrivelling are buried in soil in a greenhouse for a few days until they are plump again.

Starting Tubers into Growth and Taking Cuttings.

Early in spring the tubers are boxed up, or in the event of very large numbers being propagated, they are placed on benches in a suitable compost. The compost I use is composed of four parts old turf, not too fine, one part granulated peat, and one part of very old manure, all well mixed together. A little very sharp clean sand is sprinkled on top of this, in which the tubers are placed. Care should be taken to ensure that they are not buried too deeply. The crowns should always be free of the soil, so that one can see exactly where to take cuttings. It depends entirely on the amount to be propagated when the tubers should be started, but those with large quantities to propagate usually commence in the first days of the new year. Cuttings are then ready about the middle of February and onwards, but the ideal time to take cuttings is during March and early April. They root much quicker at that time, and are less liable to receive a check than those taken earlier. There are many methods of striking cuttings, and of all the composts I have tried I find that they root quicker in peat with a little sand added than in any other mixture.

About 10% sand is used, and the whole well mixed, and it must have a depth on the bench of at least 4 inches. This is thoroughly soaked before the cuttings are inserted, and only a light spray is given after a sunny day during the process of rooting. No shading is necessary after the first day, and the cuttings are thoroughly rooted in 12 to 14 days, with a bottom heat of 50° to 55°. I prefer a very short cutting, certainly never more than 3 inches long, and about 2 inches is my ideal size.

First Potting.

Immediately the cuttings are rooted, they are potted up into 2½ to 3-inch pots, in a compost consisting of four parts good loam well sifted, one part old manure, and one part granulated

peat. No sand is necessary if the cuttings are thoroughly rooted. They are subjected to a bottom heat of round about 55° for a few days, after which they are removed to cooler quarters. Too much heat at this stage will make the plants spindly, and this must be avoided at all costs, to ensure a short jointed stocky plant.

Re-potting.

Once the plants have filled the small pots with roots, it is advisable to pot them into 4- or 6-inch pots, using a richer compost than in the first potting. They are again placed on a gentle heat for a few days, then removed to a cooler house. The best treatment is to pot into 4-inch pots, then into 6- or 7-inch pots, as a richer compost can be used each time, and so carry on the plants better till planting time. The process of hardening off must be very gradual, and extreme care is necessary to ensure that the plants do not receive a check.

Preparing the Ground and Planting.

The ground should be turned over in autumn if at all possible, and a considerable quantity of manure added. One must be guided by the state of the soil as to what quantity to add, and by the texture as to what kind to use. On very heavy soils stable manure is to be preferred, as this tends to keep the soil more open. On light soils, cow or pig manure (or a mixture of both) is preferable. The ideal manure for light soils, in my opinion, is cow manure, to which a good quantity of peat has been incorporated. Once the peat is thoroughly saturated with the sap of the manure, it will preserve feeding in the soil much longer than manure without it. It has been proved that fertilised peat lasts longer in the soil than any other manure.

Whatever good results can be had in a depth of about 12 inches of soil, very much better results will be obtained by having the soil worked to a depth of 24 or even 30 inches. The ground should be forked over two or three times during the winter and early spring, to allow the elements to sweeten and thoroughly pulverise it.

Before planting, the stakes should be put into position (3 feet apart either way), as there is a danger of damaging the tubers or roots, if the staking is done after planting, and in the case of plants that have been worked up into 6-inch

pots, they will want to be tied when planted to prevent the wind from damaging them. A handful of dried blood is thoroughly mixed in with the soil when planting, but care must be taken to ensure that it is thoroughly well mixed. The surface soil should be well hoed for a few weeks after planting to ensure aeration of the soil, which is essential to good growth. The plants must, of course, be kept well secured, and after they have grown a little, two or three stakes are placed round each plant. By this means they can be kept secure very much more easily and the wind has no detrimental effect on the roots.

Feeding.

Weak applications of liquid manure may be given at intervals of ten to fourteen days, after the first week in July, but the feeding should be varied, according to soil conditions. On very light soils, it will be found very beneficial to give a watering with nitrate of potash, in the proportion of one ounce to each gallon of water. This will improve the strength of the stem, and is also of benefit to the tubers.

Growing for Exhibition.

In the case of the large Decoratives and Cactus, I prefer pinching the plants when they are about 8 to 10 inches high, as this tends to strengthen the side shoots, which one has to depend on for the best flowers. (The centre flower of each plant is seldom of any use.) My practice is to take one flower on each stem and let every stem come up. This ensures a succession of flower during the whole season, but I know that some growers limit the number of stems to six on each plant, and some to even three. If size is the first consideration, then the limitation of shoots will ensure that, but too much stress is put on size by judges and exhibitors alike, in my opinion, and too little on quality of bloom, which, after all should be the first consideration.

The Garden Cactus requires very little disbudding, as size is not encouraged in this class, which is essentially a vase flower for the beautification of the home. In Scotland the medium and small types are most in demand, and they are undoubtedly the most useful for any purpose. The largest types are only

suitable for garden display, but most of them are not quite so free flowering as the smaller types.

The Collarette has lost favour during the last few years, for what reason I know not, as it is one of the finest vase flowers we have, although its lasting qualities may be questioned. Now that an ideal size has been determined by our National Society (5 inches in diameter), disbudding of these is no longer necessary, and the plants can be allowed to flower at will, and carry a much larger number of blooms per plant.

Pompons keep their popularity wonderfully well, and the aim here should be to get the plants into a mass of flower by show time, as the best flowers are taken from plants in full bloom. I am pleased that the large Pompon is a thing of the past in Scottish shows, as the neat little 2-inch flower is much to be preferred. Show and Fancy dahlias can be disbudded to one bloom per stem, and even stems are limited in the case of varieties deficient in size.

Staging.

If a flower is worth growing really well, it is certainly worth staging it in a way that will show off all its good qualities. I prefer to let every flower have 12 hours in water before being carried any distance to a show, and if this method is followed, very few flowers will be lost. Always cut a small piece off the stem after arrival at the show, and this will have the effect of giving the flower a new lease of life when again placed in water. In staging dahlias, as is the case with every flower, they should be so placed in the vase that every flower can be seen individually, but all at once, if necessary. Where artificial aid is allowed, it should be made as inconspicuous as possible, and a necessary amount of foliage of some description added, to put a finish to each vase.

Dahlias from Seed.

For anyone who has a large space at his disposal, the raising of dahlias from seed proves a very interesting hobby. A bed of seedlings is most interesting in many ways, as the characteristics and colours of each plant differ in some way, and there is always the chance of raising something really good. The greatest thrill in gardening is to watch the results of one's own crossing. The disappointments are many, but the gratification

of getting even one really good variety is well worth all the disappointments. The difficulties of saving good seed in our climate are many, but it is possible, even in the West of Scotland, provided a good season is experienced. The seed should be sown during March, and the seedlings should be transplanted as soon as the first pair of leaves appear. They can then be treated in a like manner to rooted cuttings. I plant them a little closer than named varieties, as the useless plants can be taken away to make room for the better ones. Seedlings generally make a better tuber than plants grown from cuttings, and one rarely loses a seedling tuber.

3.—IMPORTED FRUITS.[1]

By William P. Kent, Glasgow.

Imported fruits have, perhaps, come more into the limelight of public attention since almost five years ago. It was after the autumn of 1931 that a revolutionary change in the status of a large list of foreign imports was made. After the financial crisis, which resulted in the overthrow of the prevailing Government, the National Government elected in its place proceeded to implement the mandate for a Protective Tariff system given to it by the electorate.

Thus it came about that an Imperial Economic Conference was convened to meet at Ottawa under the chairmanship of the Prime Minister of Canada. This conference came to be known universally later as the Ottawa Conference. Under its decisions and the effective legislation which followed the whole tenor of the importation of fruits was changed. There were, of course, certain reciprocal provisions made, but we are not concerned with these in this review.

Within the framework of the decisions arrived at, the Government also imposed certain other imports duties. The effect of these fiscal changes came under two headings. In the first, tariffs, both specific and *ad valorem*, on fruits from foreign sources to give preference on the United Kingdom markets to Empire producers, and secondly, horticultural duties de-

[1] Paper read at the monthly meeting on 5th May 1936.

signed to encourage home production and the protection of our markets whilst any development was taking place.

It was implied that some of these latter duties would be subject to modification, so as to prevent, as far as possible, any undue rise in the cost of living, the control in this matter being vested in the Imports Duties Advisory Committee. This body has continued to promulgate modifications in the light of evidence submitted to it by the interest concerned.

For about fifteen years prior to the Ottawa Conference, the development of fruit producing and exporting in the various overseas countries was rapid and progressive. During the later years of the war and throughout the boom period which followed it, there was marked prosperity in the fruit industry, and as a result the enlargement of production was thereby encouraged and undertaken. Thus, when ultimately the world-wide depression set in, the excessive supplies for the impoverished consuming markets of the world, including the United Kingdom, caused a significant slump in values. This decline was protracted, and the continued downward tendency of market prices was only partially checked in 1931 by the temporary limitation of supplies whilst the Foreign Exchange situation clarified itself, and exporting and importing interests were taking stock of the new position created by the United Kingdom renouncing the Gold Standard and later adopting the Ottawa duties already alluded to.

We have so far touched upon the period which commences about 1916. It is of interest to take stock briefly of the pre-war position. Viewed from the present enlightened standpoint, one can clearly see the pioneering and anticipation of those who laid the foundation of the present system of fruit imports, involving as it does among many other features the construction of special fruit-carrying vessels, the responsibility of producers and carriers alike to ensure satisfactory arrival condition, the regular supply of the various commodities both in and sometimes out of season, research into the methods for cold storage and preservation of the condition of fruits, the proved medicinal value of fruit in the daily menu.

In pre-war days the distribution was more insular, and it was not uncommon to find market prices fluctuating violently under the alternate influence of surpluses and short supplies.

Nowadays the distribution has been more regularised, and more modern methods have been introduced to effectively cope with the larger volume of traffic which is available.

Individual auctioneering brokers operate together with concentrated audiences of wholesale interests, and the larger private-treaty brokers also work under recognised associated rules and conditions. Such a development naturally offers more consistency to overseas exporters, and with regular supplies of all commodities passing through these channels, distributive costs are thereby lessened.

The discharge of cargoes is usually undertaken by the shipping interests on behalf of the importers who themselves supervise the segregation of grades and sizes, and in some fruits undertake the grading by opening containers and sorting the decayed from the good fruit. Wholesale buyers take delivery from quayside warehouses, transit to destination being effected by railway and road transport.

For economic reasons, ship-owners have been compelled to concentrate on one or two discharging ports in the United Kingdom for fruit from those sources which are only of more or less recent development. As crops become more extensive, and our markets able to absorb larger quantities, steamer services are being extended to the seaport markets direct, thus eliminating much in inland transport costs. As an example of this, the Liverpool and Glasgow markets are now being supplied direct with South African citrus fruit, which normally in smaller quantities was discharged at Southampton and transported by rail at extra cost to the producer.

Most of the Empire countries, and foreign countries too, have Trade Commissioners or representatives to control and advise on all matters pertaining to the marketing of produce. This contact provides close and most valuable co-operation between producer and distributor.

Before briefly studying the more important imported fruits, it is worth glancing at some rather notable facts. The United Kingdom is the world's largest single importer of fresh fruit. It was estimated that in 1934 (there is no later data available yet) the consumption of fruit per head of the population in this country was $95\frac{1}{2}$ lbs. This includes home production, but on the average about three-quarters of the total fruit consumed

is imported. In 1934 Empire sources provided almost half of the total imported. Contrast this with the four years immediately preceding the war, when Empire growers provided only 15% of our requirements. A local analysis is also worth attention here, taking at random a typically heavy early autumn week on the Glasgow overseas market. During the week ending 28th September last, there arrived to the Clyde in four steamers a total of 97,800 packages of fruit. It so happened that Empire arrivals were light that week, as of this quantity only 18,300 packages were from those sources—actually South Africa and Canada. On the remaining 79,500 packages, tariffs and import duties amounting to approximately £9,600 were paid. The market value of these arrivals amounted to roughly £9,280 from Empire sources and the foreign produce £51,000. A controversial point emerges here. Normally, when tariffs or duties are spoken of, one invariably hears of the consumer paying. Judged in relation to retail shopping prices, fruit has in the majority of instances during the past five years been available at a pre-war price level. Thus one political aim of the Ottawa duties that commodity prices would be unchanged seems to have been achieved, so far as fruit is concerned. At least, such is the claim of a large body of opinion. On the other hand, it is conceivable that the selling prices of perishable commodities is related only to the law of supply and demand. Certain it is that the consumption of fruit has increased enormously, and figures show that in 1934 our imports of fruit were practically twice as heavy as the average for the four years immediately prior to the war period. Oranges, apples, bananas, pears, grapes and lemons together, and roughly in that order of importance in volume, account for over 90% of the total fruit imports.

Oranges.

Nowadays, oranges are available on our markets the whole year round. From the middle of November to the end of May, we have Spanish and Jaffa fruit: from the middle of May to the end of October, South African, Brazilian and Californian oranges. There are also small quantities of Australian Navels available in the early autumn. Although oranges have always been the heaviest imported fruit up to 1929,

Empire sources provided only a relatively small proportion of the total consumed. Since then South Africa has progressively increased production to this country. Spain has been the main source of supply for many years, and could, in a normal season, export 6/7,000,000 boxes to this country. There are four main varieties of oranges produced there for export, the common or white orange being by far the heaviest in volume, the blood oval being next in importance, and the third, the Verna, a late and vigorous type. Finally, the Washington Navel, a recent import from America. The cultivation of this is being pressed forward, a strong effort being required to produce an orange to compete with the Jaffa variety which is imported at the same time.

The blood oval, it is believed, was a crossing of the ordinary white orange and the pomegranate, whether by natural pollenisation or graft experiment is difficult to ascertain.

The South African oranges are of two main varieties, the Navel and the Valencia Late, the latter being the heaviest in volume and more hardy in character from a marketing standpoint. There is also a quantity of Seedlings imported between the Navel and the Valencia Late seasons, but neither the quality nor volume are of much significance.

Coming to the Jaffa type, one thinks of the luxury orange of pre-war days. The growth and development of this industry is one of the most striking of modern times in the fruit trade. The United Kingdom markets absorbed $2\frac{1}{2}$ million boxes out of a total export of $3\frac{1}{2}$ millions in the 1931/32 season, and three years later consumed $5\frac{1}{4}$ million boxes of a total of $7\frac{1}{4}$ millions exported. Still more production has been undertaken. and it is estimated that in four years' time the export will exceed 15 million boxes. These figures include grape fruit, but, as this formed only 6% of the 1934 total quoted, it will be seen that the development refers mainly to oranges. The Jaffa orange being of the oval type, is more difficult to pack and, consequently, the grading requires more packing sizes. Much of the fruit is very large, especially from the newer groves. It is worthy of note that, as Palestine is territory mandated under the League of Nations, no commercial preferences are allowable by this country unless an order in Council is issued declaring that Colonial preference shall apply. This

option has not been exercised and, consequently, an *ad valorem* duty of 10% is leviable from 1st December to 30th March, and a specific duty of 3s. 6d. per cwt. applies between 1st April and 30th November.

Importing of oranges from Brazil is a comparatively recent development. In 1934 five times as many were imported as in 1929. The export types are Navel from the Northern States, and the Pera, a later variety, from the South. Since 1929 much progress has been made in the marketing of these oranges. At first the fruit was too mature when packed, and this resulted in unsatisfactory arrival condition, nor was the grading originally of a sufficiently high standard. Experience was quickly gained in these matters and effective measures introduced. There is now a system of Government control of export standards similar to that established in other export countries.

California is one of the oldest sources of supply for the United Kingdom. Since the introduction of Empire preference, the quantities of oranges exported to this country have, unlike Brazilian fruit, diminished. America was forced to absorb the surplus on her own domestic markets, as it was impossible to support the changed export conditions, especially as the country was passing through a financial and economic crisis. It must be remembered that more oranges are sold in America for drinking than for eating purposes. It is reported that in one form or another to-day, orange juice is the biggest selling beverage in the U.S.A. Spanish explorers, some time after Columbus discovered America, brought the orange and the grape fruit to Florida. These citrus fruits quickly thrived in the warm Florida climate, and ultimately the cultivation was taken up in California, Texas and Arizona. There is practically nothing exported from these two latter States. The crop is consumed on the nearer markets.

In the past few years, a relatively small quantity of Australian oranges have been imported. The Navel variety is produced extensively for home consumption and several other varieties have been tried for export. The greatest difficulty encountered up to date has been the arrival condition. This question is being studied and experimented with, and some satisfactory progress has been made. The quality of some of the Australian fruit received has been of a very high standard.

Bananas.

By reason of its regular availability, perhaps, the banana is among the best known of fruits. In many places the so-called Canary banana is preferred to the other, generally known as the Jamaica. The Canary banana is, of course, the product of the Canary Islands, the correct name of the general commercial variety being Cavendish. We are told that the islanders have a very satisfactory system of intensive cultivation and that, they have skilfully surmounted many disadvantages, including a scarcity of deep natural soil.

This fruit is packed for export in wooden crates with an inner protection of cotton wool and outer layers of straw. The fruit is ripened artificially in this country before distribution.

Any reference to the Jamaica varieties would be incomplete without observing that here is an outstanding distributive achievement. In pre-war days it was customary for the fruit to arrive green and distribution made to shopkeepers in that condition. There was then little display of attractively ripened fruit, such as we see to-day. The enforcing by the monopoly interests of compulsory careful handling, ripening and grading before delivery to shopkeepers gradually realised their hopes of adequate and properly ripened supplies of fruit for consumers all the year round. These changes were instituted about 1915.

The banana is a very delicate fruit, and much pathological research and studying of carrying conditions has been necessary to achieve the marketing standards of to-day. It was in 1896/1897 that the first shipments of Costa Rica bananas were shipped to Liverpool from New York. Five years later, in 1901, the present service of refrigerated steamers from Jamaica was commenced.

The Jamaica banana is actually the Gros Michel, and was introduced into Jamaica about 1836 by a French chemist, who brought the seedling from Martinique and planted it on his estate. The Gros Michel banana is also shipped in immature condition, but unlike the Canary Islands fruit, is carried without protective covering. The ripening and grading is carried out by the distributors in this country.

Brazil also exports bananas to this country. These are of the Cavendish type, and for economic reasons, the fruit has

to be carried without protective wrapping, being expertly stowed to enable the fruit to reach this country free from bruise and blemish, which would become accentuated under artificial ripening conditions.

It is interesting to note finally that bananas imported other than from Jamaica and elsewhere from Empire sources are subject to a tariff of 50s. per ton.

Apples.

According to our oldest history book, the apple is the earliest known fruit. In America it is popularly called the King of Fruits. Our imports come principally from the U.S.A. and Canada. In the Western American producing states the bushel box is exclusively used, and in the Eastern States the barrel, equal to about three bushels, is by far the principal package used for export. Canada is similarly divided in the matter of packing. The barrel is the older package, and the varieties produced in these Eastern sections are generally more suitable for this package, chiefly from an economic and marketing standpoint. In barrels the fruit is unwrapped, but in later years, many of the varieties susceptible to sunscald have been partially packed with a shredded oil paper (about 1½ lbs. to the barrel is the standard), and the results have been gratifying.

The Western box pack requires a wrapped fruit, chiefly waxed paper being used for this purpose. Canada and the U.S.A. are almost identical in the standards for grading and packing. These are under Government control, and inspection of export fruit is rigid and effective. The requirements vary according to colour and other characteristics of the different varieties. For instance, in the Extra Fancy or first grade of Washington Winesap, the last shipments of which are now being marketed here, the colour requirement is 75%. It is also laid down that the apples shall be mature, hand-picked, clean, well formed, sound, free from bruises, limb rubs, spray burn, sunburn, russeting, drouth spot, hail mark, visible watercore, broken skin, apple scab, stings, and from diseases and insect injury, except that slight blemishes shall be permitted in this grade.

From the Western States of the U.S.A., the principal export varieties are King David, Winesap, Spitzenberg, which

are red varieties; Jonathan, Delicious, Stayman-Winesap, which are partial red varieties; and Gravenstein and Grimes Golden, which are green and yellow varieties. From the Eastern States, the main varieties exported here in red varieties are: Baldwin, Gano, Winesap; in partial red varieties, Delicious, Stayman-Winesap, Rome Beauty, York Imperial and Ben Davis; and in green varieties, Greening and Albemarle. In Canada the boxed fruit from the Eastern section, chiefly British Columbia, are: M'Intosh Red (which forms about 75% of the total crop), Jonathan, Delicious, Newton and Winesap; from the Western provinces, mainly Ontario and Nova Scotia (the barrel sections), Baldwin, M'Intosh Red, Gravenstein, King, Wolf-river, Greening, Wealthy, Spy, Fallawater, Stark, Ribston Pippin and others in lesser volume.

The Ottawa Agreements giving a preference on the United Kingdom markets to Empire fruits have been advantageous to Canada, and the export to the United Kingdom markets has progressively increased, though there have been one or two crop features which have hindered the process.

Pears.

"The Queen of the Fruits" is the American title applied to pears. As consuming prices have become more attractive to a larger public, there is a bigger demand developing. America and Belgium have been our biggest suppliers, but with the Ottawa duties to protect them, South Africa, Australia, New Zealand and Canada, particularly South Africa, have further developed production, and Empire imports into this country in 1934 were three times greater than in 1929. Shipments from the U.S.A. have increased, too, but Belgian traffic has decreased. In 1934 it was five times less than it was prior to the Ottawa Conference. Among the varieties most popular in this country are Bartlett or William, Beurré Hardy, Beurré d'Anjou, Beurré Bosc, Beurré Easter, Winter Nélis, D'oyenné du Comice, Howell, Flemish Beauty, Packham and Winter Cole. Severe export standards are enforced for pear shipments, and with experience gained in the different varieties and their treatment, much progress has been made in the attractive marketing of the fruit.

Grapes.

The consumption of grapes continues to increase, and imports from foreign and Empire sources, particularly South Africa, are progressively heavier. The Spanish province of Almeria still supplies much the largest volume. Here the barrel package, containing about 44 lbs. fruit, packed in cork is exclusively used. This country usually takes about one to one and a quarter million barrels. The earlier or Castiza grape, which is available in September, forms only a minor proportion of the total export, the greater bulk being the legitimate or Almeria variety. Prior to the advent of South African grapes, which now reach this country about the end of January, the Almeria fruit was held from the last arrivals in December, so as to spread over the distribution up to March, but the competition from the South African fruit makes this no longer profitable. The production of grapes in Almeria is confined to individual growers, and transport to the shipping port of Almeria is still undertaken from many places with yoked oxen. A committee of shippers with Government officials control loadings to the various ports. The South African production and marketing has been supervised and encouraged by the Government Deciduous Board, which has closely studied all features of packing, transport and distribution. In 1934 almost three times as many grapes as in 1929 were marketed from South Africa in this country. There are many excellent varieties of green, red and black, and the packing and grading are of a high standard. Shipments are as yet discharged at Southampton, and thence distributed throughout the United Kingdom.

Lemons.

Italy is by far the largest supplier of lemons for the British markets. The consumption of this fruit does not vary greatly. Spain, from its provinces of Murcia and Malaga, also sends large quantities, but from other foreign and Empire sources quantities are negligible by comparison. The Sicilian lemon is claimed to have the best juice content. During the past winter the import of Italian lemons ceased, owing to the effect of the economic sanctions enforced by members of the League of Nations. Owing to market prices reacting to this shortage, other producers who would normally find our markets

uneconomic have been attracted. Chief among these is California, whence large supplies have been imported.

Transportation.

Now that we have had a brief glimpse of the main varieties of imported fruits and their producing sections, you will probably be interested in the transporting and preserving of condition of some of the fruit which has to travel long distances to our markets.

The treatment of certain varieties by pre-cooling is one of great importance to the fruit industry. This involves the placing of the fruit immediately after picking and packing into refrigerated chambers, which actuate to gradually reduce the temperature of the commodity from the influence of the ambient temperature to a level which renders it safe to be carried in a refrigerated atmosphere on its journey to the market. Pre-cooling for 48 to 60 hours, according to the commodity, is normally sufficient to reduce the fruit to the required temperature.

Pears, plums and grapes treated in this way are obviously more easily handled during transit. On the first stage of its journey the fruit is loaded, after the Government Inspector has issued an export certificate if the fruit is found to meet with the required standards, into refrigerated railway vans, or cars, as they are called in Canada and America, which are equipped with an adequate supply of ice in bunkers to ensure a safe carrying temperature. If it is a long journey occupying some days, the bunkers are replenished or salt added at prescribed intervals.

Some fruits require this full refrigeration, whilst others can be safely carried by initial icing. Under the latter system, the ice bunkers are filled to capacity when the journey commences, but no replenishment is furnished. This is of course less costly than the standard refrigeration previously described.

It is possible to obtain the history of such a car load, much as the log of a steamer denotes its movements. Ultimately the fruit reaches the quayside and is loaded into the refrigerated chambers of the steamer, which have already been prepared to receive it, separate chambers being allotted, according to the

varying temperatures required for the different commodities. Modern steamers are equipped with up-to-date refrigerating plant and have expert refrigerating engineers in their complement. The system in general use is brine circulation cooled with compressed air. It has been found from experience that smaller chambers are the most suitable and offer only a narrow variable margin of temperatures. A special refrigerating log of the voyage is kept to show the temperature readings of the different chambers, which are taken usually twice or three times every day. Ultimately the steamer docks and discharges. After such a journey the fruit should arrive in precisely the stage of maturity in which it left the original pre-cooling chambers, its natural development having been temporarily and successfully checked. Now six to seven weeks afterwards, we have the fruit to distribute as though it were produced and packed only as far away from the market as the steamer's discharging berth.

I have here a William or Bartlett pear, from the Upper Rio Negro Valley of the Argentine. After having taken about 22 days for a similar journey to the one I have just described, the consignment from which this exhibit was withdrawn was placed in cold storage on arrival, to hold its semi-ripe condition. It has been out of cold storage now for fourteen days and exposed to the normal temperatures. Although it is one of the varieties quickest to ripen, you will observe that it is still in excellent condition.

It is not necessary to pre-cool all fruits. Apples, for example, can be placed into cold storage direct after picking and packing, if it is necessary to withhold them after harvesting to supply later market requirements. For instance, this apple, the Washington Winesap, was harvested in the early part of November last and placed in the cold storage, whence it was withdrawn and shipped about six weeks ago. In the consignment from which this sample was taken, there was not more than 2% decayed apples.

Here is an Albemarle Pippin, the product of the State of Virginia. It is perhaps the finest utility apple grown in America, and, owing to its hardy and vigorous character, is comparatively easily handled after harvesting. This variety is usually packed in late September, placed into ordinary storage houses and

marketed here, any time between the end of December and the middle of May. The arrival condition is generally very satisfactory. Before leaving the storage, the fruit is examined, and any slight amount of decayed fruit, which is usually found on the top or bottom layers, is replaced. Otherwise the fruit is exported exactly as originally placed in the storage houses.

This is a sample of a comparatively new wrapper for pears. It is known as the Hartman wrap and takes the name of its manufacturer, Professor Henry Hartman, Horticulturist of the Oregon and Washington Pear Bureau. The wrap contains oil and a fungicide as a protection against Botrytis or nest-rot familiar to one variety. Other oiled wraps in common use for most pear varieties contain 16 to 20% of an odourless and tasteless oil. This type of wrapper is essential for pears which are intended to be stored for later markets. Oiled wraps are also used for apples.

Some Spanish exporters a few years ago decided to experiment in protracting the natural evaporation of acid from the orange, and so prolong its life. Solid glycerine brushed into the skins of the oranges was found to achieve a reasonable measure of success. This practice is costly and is only in restricted use. I merely mention it as an item of interest.

Experiments have been made in this country from time to time with a view to retaining fruit in good saleable condition. I have here two exhibits used in recent trials, and I am going to cut them for your examination. The orange is from Jaffa and reached Glasgow on 8th January last. The apple is a M'Intosh Red from British Columbia and was imported here on 6th January last. I am not aware of the treatment which has been applied to this fruit, but if anyone is interested, I have available the name and address of the experimenter.

4.—EARLY-FLOWERING ANNUALS.[1]

By David Armstrong, Gilmerton.

Soon after daylight spread over the land on Saturday, 1st February 1936, the air was mild, and everything was beautifully bright. Indeed it was a delightful spring-like morning, grey and blue was the dome above, with hardly a breath of wind. Birds whistled in the trees, and rooks noised overhead. Really it was a morning in which one rejoiced to be alive.

Well, we push on with the potting of zinnia seedlings into 4-inch pots. The seedlings are 1 inch high, and in the healthy cotyledon stage, while their roots have grown into the old lime which was placed as drainage material at the base of each small pot, when these were prepared to receive the seeds, in the third week of January.

The principal annual grown for early flowering, especially for cut flower purposes, must surely be the sweet pea. So, here in my discourse, it shall have pride of place. Everybody loves this fragrant and comparatively easily managed annual, yet attention to cultural requirements in every detail is necessary if success is to be attained.

The practice which I have followed in the growing of sweet peas for early flowering has already appeared in the *Transactions* of this famous Society; but I think you will allow me to outline briefly the essential cultural points, for the benefit of the many new members who have joined the Society within recent years.

To have early flowers from this annual, the seeds should be sown at the end of September, in 4-inch pots, filled with ordinary potting soil (5 seeds in each pot). The pots should next be set on an ash bottom in a cold frame, and if the soil was moist enough when the seeds were put in, no watering need be given for a day or two.

In a week or two the plumules should have pierced through the soil, but on no account try to force growth, only allow the plants plenty of air, so as to keep them sturdy and strong, and water on all occasions when the soil in the pots is dry.

When the plants have grown 3 inches high, the point should

[1] Paper read at the monthly meeting on 7th July 1936.

be removed from each, not only does this induce them to send out strong side-growths, but it keeps them sturdy. So soon as the roots have ramified freely, the plants (each 4-inch potful, now to be treated as one plant) should be accommodated in 6-inch pots, and the plants set on a shelf near the roof glass in a house where they can be kept cool and under airy conditions, and when watering, do so with care at all times. Early in the new year set a small stake to each individual stem.

Progress in growth really depends on weather conditions. Bright sunny days play a perfectly pronounced part in drawing the stems upwards. In February the plants should be transferred to 10-inch pots ; this being a convenient size in which to flower the plants. The bulk of the potting mixture should consist of good fibrous loam with the addition of some old lime. Firm potting is necessary, while a space of 2 inches should be left at the top of each pot, so that one or more top dressings can be applied when the plants are about to flower, or later if found necessary. The training of the growths to tall stakes, and the removal of tendrils, will require weekly and bi-weekly attention. The plants should be in flower by the middle of May. The Spencer varieties we have in pots this year are :

Debutante—A soft salmon or peach pink.
Giant Attraction—Salmon pink.
Picture—Creamy pink.
Powers-Court—Lavender.
Mrs A. Searles—Salmon-cerise.
George Shawyer—Salmon rose.
Sybil Henshaw—Crimson-lake.

Antirrhinum Majus Nanum var. "Nelrose."

The beautiful pink antirrhinum Nelrose has been in cultivation for many years, and its name still finds a prominent place in the seed catalogues of the present day. Its height is stated as 18 inches, but with pot cultivation I have had plants twice that height. This is really the antirrhinum par excellence for pot-work, and those who wish to have a display of charming rosy-pink blooms throughout April and May in their greenhouse, should sow the seeds in the first half of July. A pot or box will do in which to sow, and when the seedlings are suffi-

ciently grown, prick them out into 3-inch pots—3 seedlings per pot—water with care and shade from sunshine until they become established in the pots. The plants will grow splendidly in a cold frame. Greenflies may be troublesome, but they are easily destroyed by fumigating.

When the small pots become filled with roots, the plants (the three plantlets in each pot to be treated as one plant) should be accommodated in 6-inch pots, any ordinary soil mixture with the addition of some old lime will do for potting, but the compost should be made fairly firm in the pots. The plants should then be set in a cool, airy house and watered with care throughout the winter months.

As spring approaches the plants will grow rapidly, and from near the base of each individual plant several strong growths will push up and make a well-furnished pot, from which at least nine flower spikes should be obtained.

Calceolarias.

The big-bloomed calceolarias are designated greenhouse herbaceous plants, although on one occasion I noticed they were termed tender annuals, yet I never knew anyone grow them except as greenhouse annuals.

The seeds are tiny and should be sown on the surface of the soil in a pan or pot early in May. The seedlings and plants should be grown in a cold frame throughout the summer and autumn, and shaded at all times from bright sunshine ; accommodating the plants in suitably sized pots as growth increases, while a slightly humid atmosphere throughout the growing period is beneficial to the plants. A compost for the final potting should consist of good loam, a proportion of sand and leaf-mould, some charcoal and a sprinkling of bone-meal.

In September or early October, set the plants on a shelf near the roof glass in one of the cool houses, and where they will be safe from frost. The plants should start to flower in early spring.

Calceolarias, cinerarias and greenhouse primulas (except the double-flowered varieties of primulas) are now treated as annuals. Indeed these three genera have long been associated with one another, and grown as early-flowering plants for the decoration of the conservatory.

Their cultivation too is more or less carried out on the same lines, except that primula seeds should be sown in February or March to have flowering plants in December.

It was a sunny morning on the 20th of May (1936) with blue and white in the dome above. The wind veering from north to north-east was hustling the petals—which had fallen from the flowers of a great gean tree—along the pathway at 9 A.M. The day kept fine and fair with sunshine.

In the evening of the same day we passed along a guarded way, and behold, geraniums, cinerarias, and pale-yellow calceolarias, the latter associated with deeper-toned tulips, and all surrounded by a setting of green sward so sweetly kept, while tall trees in tender foliage stood as sheltering screens to these beautiful blooms.

Clarkia.

Much is made of the glorious sweet pea and the stately schizanthus, and rightly so, but I think the praises of the charming *Clarkia* should be more sweetly sung; as this dual purpose plant is so useful as a decorative pot plant, and is also one of the best annuals from which to obtain cut flowers in quantity.

Early in August is the proper time to sow seeds of *Clarkia*, should an early-flowering batch be required. A few years ago seeds of *Clarkia elegans* var. Salmon Beauty were sown in the month of February, and by the middle of March the seedlings were pricked off into small pots. The plants were twice pinched throughout their growing period, and accommodated in suitably sized pots, as root-growth advanced; 6-inch pots were used for their final shift. It is interesting to record that these plants were beautifully in bloom by the third week in June, and not one of the plants exceeded 18 inches in height. Thus by sowing in February we get plants of a reasonable height, suitable for dwelling-house decoration.

Clarkia var. Glorious, was listed as a novelty in 1934. The catalogue description reads thus, "A new break in colour for *Clarkias*, brilliant crimson-scarlet, on a dark stem and dark foliage. Very unique." I noticed that this colour would suit our purpose, so I purchased a packet of seeds; these seeds were sown early in February, and the seedlings kept growing.

The plants were stopped when 3 inches high, and repotted as growth advanced, until they were transferred to 6-inch pots, in which size they flowered profusely throughout the month of June, when the plants were 2 feet high.

Stock Christmas Pink.

This stock is classed among the winter-flowering kinds, and as a half-hardy annual. It is a splendid stock for pot-work; but our plants did not flower at Christmas, that no doubt was owing to the seeds not having been sown sufficiently early.

To have plants in flower at Christmas, the seeds should be sown about the end of May or early in June. It is only in February and March, however, that the blooms of this charming stock become richer in colour, and, strange to say, this improvement in colour is confined to double blooms only.

Our method of growing this stock is to space out the seedlings so soon as they are fit to handle, into 4-inch pots, 5 seedlings in each pot, then place the pots in a cold frame. When sufficiently grown—each 4-inch pot of plant was accommodated into a 7-inch pot. The pots were returned to the frame, and the plants grown there till near the end of September, when they were removed to one of the cool glass-houses.

Christmas Pink stock grows from 2 to 2½ feet high, and the five plants in each pot are needed to properly furnish each large pot with foliage and flowers. This type of stock is stated to be of a branching habit, but in our case the plants did not branch out.

Stock Empress Elizabeth.

Stock Empress Elizabeth is also included under the heading of winter-flowering stocks. It is related to the type known as "Beauty of Nice," or the Nice stock, which is stated to be a half-hardy annual.

Although this stock has been in existence for over twenty years, I have never seen it cultivated under glass, or indeed in the open anywhere in Scotland. Nor can I recall ever seeing it catalogued in any of our Scottish seedsmen's catalogues.

I have been interested in stocks for many years; therefore you can quite understand that I have kept a lookout for any new kind likely to suit our purpose for winter and spring flowering under glass.

Seeds of Empress Elizabeth were purchased in 1931, and sown about the beginning of May. The seedlings when fit to handle were pricked out, and kept growing, and the plants flowered under glass in the spring of 1932. So far I was not overjoyed at the results. However, one plant was retained for seed purposes ; but not being enamoured of this stock, the *siliquas*, when ready for picking, were secured but put aside.

In January 1934 these *siliquas* were cleaned and the seeds sown about the end of that month. In due course the seedlings appeared and were spaced out into boxes, and when sufficiently grown, and properly hardened off, they were set out in a rather dull part of the garden at the beginning of May 1934.

The plants grew splendidly, flowering throughout November and December 1934, and in January 1935 the rosy-carmine flowers were borne by side branches (or shoots). These flowering branches measured 8 and 10 inches long, and were situated in the axils of the leaves on the main stems, at 12 and 14 inches above ground-level, with 6, 8 and sometimes more branches per plant. The strong main stem of each plant was 2 feet high and, near the ground-level, was half an inch in diameter.

After January 1935 the plants did not look so nice. They had suffered from the variable weather conditions throughout that month. However we left the plants in the beds, and strange to say a good show of flowers was produced in May and June, but this time from the central or main stems. Just exactly one year from the time the plants were set out in the beds did these central stems deign to bloom, and one year and four months from date of seed growing. Thus you will see what a peculiar stock this is, in that the central or main stem was last to produce flowers. The reverse is the way of most other kinds of stocks.

Stock Brompton, New Hybrid Harbinger, Mixed Colours.

Seed was sown at the end of July last year, and the young plants received the usual care and attention necessary to their well-being. A number of the plants were 16 inches high, and green budded early in January (1936). I applied the stopping method on two plants, and I could give details of my experience, but, to sum up, Harbinger needs no stopping, as the unpinched plants produced the best spikes and expanded their flowers

during the last week in February, while the stopped plants did not bloom till three weeks later.

Brompton Stock var. Express Rose Pink.

Seeds of this beautiful stock were sown in heat, about the end of January 1935. When the seedlings were sufficiently advanced, they were pricked out into boxes and carefully grown. So soon as the plants were properly hardened, the boxes containing the plants were set out of doors. In May the plants were set out in the borders, and commenced to flower (there) early in July. I noted that the single-flowered plants of this variety grew taller than plants which produced double flowers. On one double-flowered plant I counted twenty individual blooms, truly it was a magnificent spike. Just to show that the ten-week stock has not been omitted, I may mention that plants raised from seeds sown last November and grown throughout in pots did not flower till May. While plants of the same variety raised from seeds sown in January (of this year) were set out in the open border early in May, and were well budded for flowering three weeks later.

5.—THE SCOTTISH SEED AND NURSERY TRADE—150 YEARS AGO.[1]

By Thomas Thomson, Edinburgh.

I do not think it is properly realised, even by seedsmen themselves, that the Scottish Seed and Nursery Trade is not just a thing of yesterday, but that it is an industry that can boast of quite an ancient lineage. It has been in existence for more than 200 years, and is older than the Highland Society, and older than even the Board of Agriculture. It is a matter of pride with us that a number of firms in our Association to-day can trace their ancestry back to the early beginnings of the seed trade—some of them are over 200 years old—and they are not feeling any the worse of their old age, but, on the contrary, are just as fresh and vigorous as ever they were at any time in the course of their long and honourable career.

[1] Paper read at the monthly meeting on 1st September 1936.

Among these firms are Messrs Austin & M'Aslan of Glasgow, who began business 217 years ago; Dicksons & Co., Edinburgh, founded in 1729; Wm. Drummond & Sons, Stirling, founded more than 150 years ago; Dickie, Fowlds & Co., 1750, Samson's 1759 (both of Kilmarnock); and the Haddington firms, Roughead & Park, 1755; Wm. Dods & Son, 1782; and Peter Lawson & Son, Edinburgh, 1770.

There have been a great number of seed firms that came into being during these past 200 years, who worthily served their day and generation, and have passed away. It might be of some interest to hear the names of a few of the seedsmen who were in existence in 1784. Here are some of their advertisements in the *Edinburgh Advertiser :*

> " David Fairweather, Seed Merchant in Pleasance of Edinburgh has now got in a large quantity of Rye and Natural Grass Seeds, the Natural Grass Seeds fit for sward or pasture ground as there is a good mixture of Clover and Ribgrass amongst them, each kind at 4/- per boll, those who take a quantity shall have a boll to the score, or discount for ready money; likewise clean dressed Ryegrass from 8/- to 10/- per boll, these prices being low on account for ready money—(May 1778)."

Another :

> " Garden and Grass Seeds. Just arrived from London, Holland, and other proper places abroad, and to be sold by John Richmond & Company, Seed and Nurserymen, at their shop near the foot of the West Bow, west side, Edinburgh. All kinds of Garden, Grass, Tree and Flower seeds, viz. Onion, Carrot, Leek, etc., English and Scots Ryegrass, White and Red Dutch Clover, English Red Clover, Yellow Clover or Trefoil, Ribgrass or Plantain, Lucerne, Buckwheat, St. Foin, all kinds of Garden and Field Turnip Seed, Summer and Winter Tares, Kentish Hops, and all sorts of Pot Peas, Bird Seeds, etc. At their Nurseries half-way betwixt Edinburgh and Leith a large collection of the best kind of Fruit trees and Forest trees, also great quantities of large Sweet Briers and Crab Apple stocks all fit for hedges, with a fine collection of flowering shrubs, etc. . ...

"Noblemen and gentlemen provided with good gardners.
"Printed Catalogues to be had at the Shop, gratis—(February 1778)."

There were also Anderson, Leslie & Co., Edinburgh; Martin & Kerr, Leith; and Thomas Walker & Sons, Quality Street, Leith. Walker's had an advertisement in May 1784:

"Flemish Red Clover Seed. A quantity of the very best Flemish Red Clover seed, crop 1783, in bags, to be sold at our warehouse, Quality Street, Leith. The Seed is of an excellent quality and will be sold on reasonable terms."

Down the Portobello Road, nearly opposite the offices of Messrs Dobbies, standing in off the road, there is an extraordinary and very peculiar monument. It is a huge oblong block of solid masonry standing about 30 feet high, the stonework of the arched top and its surrounding frieze are finely carved, and on the two long sides are depicted, in finely sculptured marble, two scenes from Old Testament Scripture, one is the overthrow of Pharaoh's army in the Red Sea, and the other, the Song of Moses and Miriam at the discomfiture of Pharaoh and his hosts. This strange monument was erected in memory of a man whose father was a seed merchant in Edinburgh, and his father before him, and it is of the grandfather I want to tell you. His name was Wm. Miller. He was born in 1677. His seed shop was at the foot of the South Back Canongate, just across the road from the courtyard of Holyrood Palace—a quiet, peaceful out-of-the-way spot at the gates of the Royal Park, with a view of the green slopes rising to Arthur Seat. Quiet and peaceful, till one never-to-be-forgotten day in the autumn of 1745, when the astonished Wm. Miller saw the courtyard suddenly filled to overflowing with a vast multitude of cheering, frenzied citizens and clansmen, and in their midst, on his horse, happy and smiling, Prince Charles Edward Stewart, handsome and glamorous, and picturesque in his tartan coat, scarlet breeches, long military boots, a green velvet bonnet with a white cockade, a broad blue ribbon across his shoulder, and on his breast the Star of the Order of St Andrew. And during those six wonderful weeks that followed, Wm. Miller watched the animated scenes. He saw the comings and

goings of the officers and the chieftains in their tartans, he saw the crowds of the elite of Edinburgh flocking to the palace, to the grand balls and banquets given by the Prince in the Great Picture Gallery. Many times he saw Prince Charlie riding out in the mornings with a group of his officers, round the park to Duddingston, to inspect his army and to mingle with his troops. And he did business with them too—just before the battle at Prestonpans he got an order for five hundred shovels! Then the day came when they marched away to England, the palace was closed, and quietude came again to the courtyard.

In the following spring, we find this notice in the *Caledonian Mercury :*

> " Wm. Miller, at the foot of the Horse Wynd, near the Abbey at Edinburgh has just now brought from both Holland and London, great varieties of the new and fresh Garden Seeds, sundry kinds of grass seeds, flower seeds and tree seeds (particularly English acorns procured from the largest and best trees at 2/- sterling per peck) several kinds of Gardners utensils, with a choice collection of fine fruit trees, all to be sold by him as usually, as also Young Walnut and Larix or Larch trees and some other kinds, with Colliflower, Artichoak and Asparagus plants etc. N.B. He having Conveniency has proven many kinds of his Garden seeds, sees they grow extraordinary well and are all as cheap as they have been for many years past."

So you see, business was now going on as usual—but perhaps not just quite as usual, for there was now some competition. A Patrick Drummond had opened a seed shop up in the town, nearer the centre of things—listen to the rather subtle wording of his advertisement, and notice his side lines.

> " Patrick Drummond at his shop in the Lawnmarket opposite to Libbertons Wynd Edinburgh has just now brought from the properest places abroad, all sorts of the best and freshest garden seeds, flower seeds, grass seeds and such tree seeds as last season produced, to be sold by him as cheap as anywhere else in Scotland, and as a proof of their freshness several of the principal sorts may be seen growing extraordinary well in Pots in his shop. He likewise

sells all sorts of Gardening utensils, New hops, cheap and good, finest eating oil at 2/- per flask and 2/6 per Chopin bottle. Sundry sorts of Pot Peas particularly fine English spleet peas, all sorts of plain and gilded writing paper sealing wax and wafers in wholesale or retail likewise Collyflowers Savoy and different kinds of Cabbage plants all raised from his own seeds. Any who want Catalogues of the Seeds etc may have them at the above shop."

These are from the *Caledonian Mercury* of 1746.

Here I should like to draw your attention to the fact that, as you see from these advertisements, Scottish seedsmen were in the habit of testing their seeds for germination, and this 200 years before the establishment of Official Seed Testing Stations !

I must mention just one other of a later date—a firm called Eagle and Henderson. Henderson had come as a lad from Peebles-shire and found employment in the shop of Mrs Eagle (Mr Eagle died about 1760 and his widow carried on the business). He rose to be Lord Provost of the city. He was also Master of the Merchant Company, and it was he who was largely responsible for the foundation of the National Bank of Scotland and of the Scottish Union and National Insurance Company. His name is commemorated in Henderson Row—in the north side of the town.

These firms, although they are now no more, are all so many links in the long chain that extends from a distant past, and will extend to a distant future. As well as the old firms who are still with us, there are many firms founded within the last hundred years, who, with the older firms, will preserve the continuity of our trade, and who will, I feel sure, be vigorous and flourishing two hundred years after this.

I think it was Dr Johnson who said something to the effect that there are many generations between the seed and the timber, and so it is. It is more than two centuries since the Earl of Haddington began planting at Tyninghame about 300 acres of barren sandy soil, and now after 200 years we have the beautiful Binning Woods.

It was in 1750-60 that the Duke of Atholl (John the Planting Duke), began planting at Taymouth and Scone, hitherto tree-

less, those woods which are so magnificent to-day. He covered 16,000 acres with 27 million larches. And, further back still, in 1716, Grant of Monymusk, then a youth, began planting, and continued the good work till his old age, and in his lifetime he had planted 50 million of spruce ; and all the pine woods that one sees planted up and down the country, and which are such a fine feature of our Scottish scenery, were planted anything from 100 to 150 years ago. So you see we need to have longevity and continuity and patience.

In the early summer of 1784 the Scottish Seed and Nursery trade had their first meeting. In February there had been a convocation of fifty gentlemen in Fortune's Hostelry in the High Street—noblemen, landowners, lairds and agriculturists —who had formed themselves into a Society—the Highland Society. Now, many of these gentlemen were good customers of the nurserymen and seedsmen of that time, and Peter Lawson, shrewd old gentleman that he was, thought it might not be a bad idea for the seed and nursery trade to have a meeting too—so after the busy season was over, he wrote letters to the leading firms, inviting them to have a little dinner with him on the evening of Friday, 28th May 1784, in the Cross Keys Hostelry in the High Street (Old Stamp Office Close). Among those to whom Mr Lawson wrote, whose firms are still in existence to-day, were Mr Wm. Drummond, Stirling ; Mr M'Aslan, Glasgow ; Mr Peter Roughead and Mr Wm. Dods of Haddington ; and Mr Dickson.

So on a fine May morning, Mr Drummond set out from Coney Park Nursery, Stirling, and took his seat in the diligence that ran to Edinburgh on Mondays, Wednesdays and Fridays, at 8 A.M., fare 9s. 6d., and duly arrived at the White Horse Inn, Grassmarket.

Mr Drummond was a man with an alert mind, an original thinker, and a great reader. So immediately after his arrival, he set off up the West Bow for William Creech's bookshop in the Luckenbooth's, a high " land " at the north door of St Giles' Church. Creech was a man of education and culture, a son of the minister of Newbattle, and it was Mr Drummond's delight to have a talk with a big-minded man like Mr Creech. So they had a fine chat, sitting together in one of the windows

on the first floor, with a view down the picturesque vista of the broad High Street and the steep Canongate—with the sea in the distance—Aberlady Bay, Gosford House and the hills of East Lothian. Mr Drummond always enjoyed watching from the window the crowds of people in the street below, the interesting moving-picture of city life.

Mr M'Aslan had had an early start, too. The coach left Glasgow at 8 A.M. (fare 12s. 6d.). They had come through at a rattling good pace, with a change of horses at Whitburn. He wanted to have a talk with his friend Dr John Hope, the Regius Keeper of the Botanic Garden (a grandson, by the way, of Lord Rankeillor), and to have another tour through the Garden in his company, for it was always interesting and educative. The Garden was situated in a valley at the foot of the precipitous rocks on the south side of the Calton Hill, where the Waverley Station now is. It had begun to be formed in 1675, so was now over 100 years old. It was a wonderful place, with a splendid collection of shrubs and plants and medicinal herbs of all kinds ; and tropical plants were nurtured in houses of glass, something unknown in those days. I might mention that a yew tree that was a conspicuous feature of the Physick Garden can be seen in the Royal Botanic Garden here to-day. It must be of very great age. After spending a fine time with Dr Hope, Mr M'Aslan wended his way to Dickson's Nurseries—to have a crack with Mr Dickson.

The Haddington contingent, Mr Peter Roughead and young Dods, arrived by the coach the " Tally-Ho," a spanking team that did the journey in less than two hours. They had been commissioned by their wives to try, when they were in Edinburgh, to secure seats in the Theatre Royal in Shakespeare Square to see Mrs Siddons, about whom everybody seemed to have gone crazy. It was said that even the ministers up for the General Assemblies, and their women folks, were being lured to the theatre in such numbers that the Assembly Meetings were quite thin, and several evening sittings had to be suspended. So, after a light repast, the Haddington gentlemen went to Shakespeare Square, and there they saw a surprising sight. An extract from the *Edinburgh Advertiser* will give the best description of it :

" Such is the rage for seeing Mrs Siddons that hundreds

of ladies and gentlemen are waiting at the gallery doors from one o'clock though the Play does not begin till half-an-hour after six, and the moment the doors are opened at three o'clock both galleries are filled with ladies and gentlemen. The loss of hats, cloaks, canes, wigs, shoes, etc., are reckoned very trivial misfortunes. In short, the public seem to be perfectly Siddonized."

Now, let us look in at Fortune's Hostelry at nine o'clock that evening. In a handsome oak-panelled room the company is seated around a large circular table. They have finished a choice repast, chosen with discriminating taste by Mr Lawson, who is a regular patron of the hostelry, and who made it a principle as well as a hobby to entertain his customers with lavish generosity.

They have had rizzared haddock, Nor' Loch trout, tripe, haggis, and fragrant hashes, with claret and good Edinburgh ale.

The table has been cleared, the table-cloth, of fine Dunfermline linen, has been removed. A silver candelabra, holding six red wax candles, now stands in the centre of the shining mahogany table. A painting by Allan Ramsay hangs above the decorated marble fireplace, a Chippendale cabinet by the opposite wall, and a fine old grandfather clock stands in the shadows in a corner.

The younger men are smoking cheroots and the older men frequently refresh themselves with a pinch of snuff. The dinner has been perfect and the meeting happy and harmonious.

And so we will leave them, enjoying themselves, making better acquaintance with one another and developing that spirit of friendliness and kindliness which has always been such a pleasing characteristic of the seed trade.

And now I must draw to a close. I have tried to present a picture of how things were in 1784, 150 years ago, and I hope you have been interested in the story of the seedsmen. To the seedsmen I would say this, the nature of our industry demands continuity, so plan for it. I would go further and say it calls for perpetuity—then plan for it. Remembering always the age-long promise " Seed time and harvest shall not fail while the earth remaineth."

6.—HINTS ON MANURING.[1]

By Wm. Smith, M.A., B.Sc. (Agr.), Edinburgh.

Considerable progress has been made in the science of manuring since the beginning of the century, and much has been learned not only about the functions of the major plant foods but of the minor elements as well, like boron, manganese and magnesia. It is now definitely established that a plant requires something like eleven elements to keep it in full health, and the duty of the cultivator is to see that the plant is supplied with all of these in ample measure, for if one or more is lacking then the whole balance is upset and a stunted, unhealthy plant is the result.

Manures may be divided into two classes, organic and inorganic ; the first covers those derived from living creatures, like dung, bones, feathers, blood, fish manures, etc., and the second class, those made from rocks or manufactured by man, like basic slag, sulphate of ammonia and potash. The relative merits of organic fertilisers over inorganic form a frequent subject of discussion and controversy, but there is no critical evidence to support the alleged superior value of organic manures as compared with inorganic. It is conceivable, however, that bulky hygroscopic materials, like shoddy, may prove superior to inorganic nitrogenous materials in the case of certain bush fruits, where the retention of soil moisture may be important and where the organic matter content of a soil is low. In the case of top fruits, however, experiments conducted in this country have not given results which would justify any great discrimination being made between the two forms of plant food.

Farmyard manure is the basis of all manuring, and is complete in the sense that it contains all the plant food in which the soil is likely to be deficient, although the balance between the main ingredients may not be the best possible for certain crops. In addition, it provides a suitable host for the multitudes of bacteria which are present in all fertile soils and which are essential to the welfare of the plant. Its quality varies considerably according to the class of stock kept, kind of litter used, richness of

[1] Paper read at monthly meeting on 6th October 1936.

food consumed and the way in which it is made. The composition of average farmyard manure, however, which has been well made, contains about 15 lbs. nitrogen (N), 6 lbs. phosphoric acid (P_2O_5) and 13 lbs. potash (K_2O) in every ton. We see, therefore, that large quantities of dung must be applied to replace the plant food which an average crop takes from the soil, as will be seen from the following figures in lbs. per acre :

	N.	P_2O_5	K_2O
Cabbage	80	213	288
Carrots	65	166	193
Rhubarb	34	146	405

It also has a wonderful effect on the texture of soils, opening up clays and preserving the moisture content in sands and light loams.

Artificial manures may be classified under three heads : nitrogenous, phosphatic and potassic. These are not interchangeable as each serves a distinct function in the economy of the plant. Speaking generally, it might be said that nitrogen encourages the growth of leaf and stem primarily, phosphate helps root and grain development, whereas potash is essential for the manufacture and storage of starch and sugar, and acts as a kind of health insurance. These are all necessary for the ordinary farm and garden plant, and the skill of the cultivator will lie in applying them in the proper balance to suit various crops in varying soils. The question of balanced rations for crops is just as important as for stock, and has been the subject of research for a considerable number of years.

Let us now consider the manuring of some of our common horticultural crops and see what experiment and experience have arrived at. There is probably no crop which responds better to a dressing of artificials than the potato, provided the food balance is kept right. Formerly, phosphate occupied too prominent a place in a potato compound, but now we know that nitrogen and potash are the two essential factors, with phosphate of much less importance than was previously thought. A 2-3-2 balance, *i.e.*, 2 cwts. sulphate of ammonia, 3 cwts. superphosphate and 2 cwts. sulphate of potash has proved very satisfactory in most soils, although experiments have shown that a 3-3-3 balance over a number of years has given practically

1 ton more per acre in the case of poor soils and where large crops can be grown. Sulphate of potash is recommended in preference to muriate or potash salts in that it produces a tuber which has a higher percentage of dry matter and is therefore a better cooker and keeper.

Root crops on the other hand demand a different balance with phosphate the predominating element and just enough nitrogen to start the seedling, and sufficient potash to make the necessary sugar. The cabbage family again will demand a much higher nitrogenous dressing, as most growth is above ground. Recommendations for these and other crops are detailed on succeeding pages.

Prior to 1920, the only investigations of note into the manurial requirements of fruit crops in this country were made by Bedford and Pickering at Woburn, and by Dyer and Shrivell at Hadlow, but since that date many manurial problems have been closely investigated at Long Ashton and East Malling Research Stations. Pot culture experiments have been carried out in conjunction with field trials, and, as a result of these, we now know the symptoms which are peculiar to the deficiency of each of the three named fertilising elements, viz. nitrogen, phosphate and potash. Nitrogen starvation shows up more quickly than the others, and may have serious effects even in one season. Foliage development is greatly restricted, with the leaves small and of pale yellowish-green colour. The blossom and leaf buds are late in opening, while the former are weak and often die. The trees defoliate early, and at the time of defoliation show deep orange or red tints. Any fruits which are formed remain small and highly coloured with a red flush, the ground colour being practically white ; whilst the flesh of the fruit tends to be white, it is hard and crisp and often very sweet. For this reason the fruits keep well, both in a common store and under cold storage conditions. If trees, therefore, are grown under low nitrogen conditions as distinct from nitrogen starvation, fruits have valuable dessert properties but are not popular for culinary purposes. Low nitrogen conditions reduce yields drastically, and a compromise is usually necessary between yield and quality to obtain the best financial returns.

The effects of phosphoric acid deficiency are similar in many respects to those of nitrogen starvation, but the leaf tints are of

bronze or dull purple shades, while the fruits also assume a bronze colour and are soft and lacking in character.

Potash deficiency, on the other hand, produces quite different results, in that the opening of blossom and leaf buds may be hastened and the trees may become well covered with fruit buds. Shoot-growth is greatly restricted, and, although the leaf is small and normal in colour in the early part of the season, the margins, later on, assume a scorched appearance and exhibit the conditions known to fruit growers as " leaf scorch." Fruits are often abundant but remain small and may fall prematurely, and they generally retain a dull green, immature appearance long after picking time, and are thus poor keepers under cold storage conditions. The Research Stations have shown, both by pot culture experiments and field trials, that potash deficiency is the most important manurial problem in practically every commercial fruit-growing area in the country, for it has been shown to occur in all types of soil, but most frequently on light loams, on shallow, poorly weathered soils, and on heavy soils in wet conditions. Soil acidity is not a serious problem, but highly calcareous soils are often unsuitable for fruit growing due to chlorosis.

In deciding the question of proper manurial treatment, we must discriminate between grass culture and arable systems of fruit growing, as grass culture brings about drastic nitrogen starvation in trees, whereas cultivation encourages highly nitrogenous growth. Nitrogenous fertilisers must generally be used with caution and with particular regard to the growth of the trees and the yield and quality of the fruit. They generally increase the yields of bush fruits, stone fruits and pears, but their action is less consistent on apples grown under arable conditions. Where potash is deficient it is always advisable to withhold nitrogenous fertilisers since their application only accentuates the deficiency. It is prudent, therefore, to maintain the supply of potash in the soil to the extent of 2 cwts. sulphate of potash per acre, but where extreme deficiencies occur, then annual dressings of 2-4 cwts. per acre should be given for a period of 3 to 5 years to restore healthy growth. Autumn application to fruit trees is recommended, in order to secure the washing down effect of the winter rains.

There is a popular idea that lime is essential for stone fruits,

such as cherries and plums ; there is, however, no good evidence to confirm this point ; neither has it been shown that lime is beneficial to fruits on the classes of soil used for fruit growing. Certain fruit crops thrive on slightly acid soils, and where poor results have been obtained, the addition of lime has had negative results, whereas potash manuring has proved beneficial. The plum is the most suitable class of fruit tree to grow under market garden conditions, as it requires a plentiful supply of nitrogen to maintain vigorous growth and the production of high quality produce.

We see, therefore, that the problem of manuring in relation to fruit quality is an important one, as the largest specimens of fruit are not obtained under the highest nitrogen conditions but those most favourable to carbohydrate storage within the fruits, and where in addition nitrogen is not the limiting factor to growth. These conditions lie within the range of the extremely high and low levels of nitrogen feeding under which fruit trees will thrive, and must be determined by experience in particular cases.

It is impossible to give general recipes that will suit all types of soil and climatic variations, but the following recommendations are offered confidently as a sound basis on which to work under Scottish conditions.

Cwts. per Acre.

Cabbage Family.

Cabbage, Kale, Cauliflower, Broccoli, Brussels Sprouts.

cwts. 3 Sulphate of potash.
3 Superphosphate (13·7%).
4-6 Ground hoof and horn meal or dried blood.

Mixed, distributed and harrowed in before planting. 1-2 cwts. sulphate of ammonia or nitro-chalk or nitrate of soda may be used as top-dressing in one or two applications in February and March in case of spring cabbage. Lettuces and spinach will respond to smaller dressings of same mixture, say 8 cwts. per acre.

Root Crops.

Carrots, Parsnips, Onions, Turnips, Celery, Rhubarb, etc.

cwts. 3 Sulphate of potash.

cwts. 4 Superphosphate (13·7%).
2 Ground hoof and horn meal or dried blood.
1 Sulphate of ammonia.

Mixed, distributed and harrowed in before planting or sowing, or applied round the plants in early winter in case of rhubarb.

POTATOES.

With moderate dung dressing.

cwts. 2 Sulphate of potash.
3 Superphosphate (13·7%).
2 Sulphate of ammonia.

Without dung.

cwts. 3 Sulphate of potash.
4 Superphosphate (13·7%).
3 Sulphate of ammonia.

On soils which are not in particularly good heart and where the conditions are favourable for high yields, the following dressings are recommended :—

With dung.

cwts. 3 Sulphate of potash
3 Superphosphate (13·7%).
3 Sulphate of ammonia.

Without dung.

cwts. 4 Sulphate of potash.
4 Superphosphate (13·7%).
4 Sulphate of ammonia.

The above fertilisers can be mixed together before application, and should be broadcast along the rows before planting.

SCARLET RUNNERS or DWARF BEANS.

Under intensive market garden conditions.

cwts. 2 Sulphate of potash.
4 Superphosphates (13·7%).
2 Ground hoof and horn meal or dried blood.
1 Sulphate of ammonia.

The above fertilisers can be mixed together before application and should be applied and harrowed in before sowing.

TOMATOES.

Under ordinary conditions

Base Dressing.

lb. ½ Sulphate of potash.
¼ Ground hoof and horn or meat meal. } or ½ lb. fish meal.
¼ Steamed bone flour.

Per square yard, or to 200 lbs. potting soil if grown in pots.

If the soil is a turfy loam taken from a field where an accumulation of nitrogen has taken place, or if dung has been used and the soil contains above an average amount of nitrogen for some other reason, it will be advisable to give less hoof and horn or meat meal than that recommended above, or to cut it out altogether in the base manure.

Top Dressing (after first truss is formed).

1 part Sulphate of potash.
1 ,, Sulphate of ammonia.
1 ,, Dried blood.
2 parts Superphosphate (13·7%).

Use every fortnight, 2 ozs. per square yard, or 1 oz. to pots holding about 20 lbs. soil.

After Soil Sterilisation.

By *Steam.*—The effect of sterilising the soil by steaming is to cause a large production of ammonia, and the withholding of the nitrogen from the base manure is necessary in this case. The following dressing is recommended prior to planting :

lb. ½ Sulphate of potash } per square yard.
¼ Steamed bone flour }

Top Dressing (after growth is steadied).

1 part Sulphate of potash.
1 ,, Sulphate of ammonia.
1 ,, Dried blood.
2 parts Superphosphate (13·7%).

Use every fortnight, 2 ozs. per square yard, or 1 oz. to pots holding about 20 lbs. soil.

After Soil Sterilisation.

By *Chemicals*.—The effect of antiseptics is also to cause a certain production of ammonia, but not usually in such large amounts as those produced by steam. The amount of ammonia produced will depend on the antiseptics used and the amount applied per acre. The sulphate of potash treatment prior to planting, along with a certain amount of phosphates, as recommended above, is important, but the question of nitrogen and the quantity will have to be determined by local conditions. A certain amount of nitrogen in the form of ground hoof and horn or meat meal may also be advantageously applied with the sulphate of potash prior to planting under these conditions. Top-dressing later with a similar mixture to the above will also be necessary.

VINES.

As a winter dressing after pruning, a suitable mixture might be made up as follows :

1 part Sulphate of potash.
1 ,, Hoof and horn meal.
1 ,, Bone flour.

Fork into the border 3 to 4 ozs. per square yard.

As a late spring or early summer dressing, the following mixture may be used :

2 parts Sulphate of potash.
1 part Sulphate of ammonia.
1 ,, Dried blood.
1 ,, Superphosphate (13·7%).

Apply at the rate of about 2 ozs. per square yard, firstly after thinning, and again when the first swelling is finished.

Where there is some difficulty in getting grapes to colour properly, it is recommended to use, in addition, sulphate of potash by itself, at the rate of about 1 oz. per square yard, and to water it in well.

FLOWERS.

Chrysanthemums.

To make 1 cwt., mix together :

Lbs. 28 Sulphate of potash.
28 Sulphate of ammonia.

Lbs. 28 Ground hoof and horn meal or dried blood.
14 Superphosphate (13·7%).
14 Steamed bone flour.

2 to 3 ozs. per square yard, or 1 oz. to 28 lbs. potting soil.

Roses.

Lbs. 28 Sulphate of potash.
21 Sulphate of ammonia.
14 Ground hoof and horn meal or dried blood.
35 Superphosphate (13·7%).
14 Steamed bone flour.

2 to 3 ozs. per square yard in spring, raked into ground round bushes.

Bulbs.

For flowers and bulbs. To make 1 cwt., mix together :

Lbs. 28 Sulphate of potash.
14 Sulphate of ammonia.
28 Ground hoof and horn meal or dried blood.
21 Superphosphate (13·7%).
21 Steamed bone flour.

2 to 3 ozs. per square yard in early autumn and rake or hoe into the ground.

General Fertiliser for Flowers.

To make 1 cwt. mix together :

Lbs. 28 Sulphate of potash.
28 Sulphate of ammonia.
14 Ground hoof and horn meal or dried blood.
28 Superphosphate (13·7%).
14 Steamed bone flour.

2 to 3 ozs. per square yard, raked into ground before sowing or planting.

FRUIT.

Dressings per acre per annum.

Apples.

2 to 3 cwts sulphate of potash applied in autumn. A higher

dressing up to 6 cwts. per acre should be applied annually in case of diseased trees until they are sound and healthy.

Nitrogen to be applied must be determined by local conditions—3 to 4 cwts. superphosphate or basic slag every third or fourth year.

Pears.

Cwts. 2-3 Sulphate of potash (autumn).
2-3 Sulphate of ammonia (spring).

Plums.

Cwts. 2-3 Sulphate of potash—on healthy trees (autumn).
4-6 Sulphate of potash—on unhealthy trees (autumn).
4-5 Sulphate of ammonia (spring), on healthy trees only.
3-4 Superphosphate or basic slag every third or fourth year.

Cherries will respond to same (but probably less intensive) dressing as plums.

Black Currants.

Cwts. 3 Sulphate of potash (autumn).
4-5 Sulphate of ammonia or nitro-chalk (spring).
3-4 Superphosphate or basic slag every third or fourth year.

Red Currants, Gooseberries, Raspberries.

Cwts. 2-3 Sulphate of potash (autumn).
3 Superphosphate or basic slag every third or fourth year.
1-2 Sulphate of ammonia or nitro-chalk (spring).

Strawberries.

Cwts. 2-3 Sulphate of potash (autumn).
4-5 Superphosphate or basic slag (autumn).
1-2 Sulphate of ammonia if required (spring).

7.—GARDENING THROUGH THE AGES.[1]

By John T. Jeffrey, Superintendent of Parks, Edinburgh.

In all probability the commencement of gardening was when man found that by saving seed and sowing it in positions where he proved by experience crops grew better and produced certain items which provided a greater variety of diet than when left to take care of themselves in their wild state. Man was definitely intended to assist the growth of vegetation if not actually to improve upon it. Very early in the Bible, we read of the fruit of trees and herbs flourishing. Herbs undoubtedly included edible vegetables. Reference is also made about trees being good to look upon. Continuing, there is an account of a vineyard being planted by Noah. Excepting the apple and fig, perhaps the grape is more often mentioned in history than all the other fruits. We know by records that vines were introduced into England by the Romans, so also were figs. Whether the climate of our land was more tropical, or whether the standards of wine have changed since the coming of the Romans, I don't know, but the Emperor Probus encouraged the planting of vines about the year 280 A.D. It is also interesting to note, while referring to the Romans, that they introduced figs into Italy at a much earlier date. Unfortunately they only secured a cultivated variety which proved sterile. Years after, by introducing a wild variety of fig from Asia which provided a parasite necessary to the fertilisation of the fig, did fruit develop on the Romans' fig trees. Within recent months, I have visited a large fig garden at West Tarring in Sussex where splendid crops are produced annually. In this garden there is a fig tree reputed to be planted by Thomas a Becket, so we must conclude that horticulture has been receiving attention from very early times in our own land. Undoubtedly we have to thank the Romans for introducing horticulture into Britain. Their ideas in this as in many other sciences and customs was far ahead—many centuries—of the customs of the inhabitants of our island.

With the fall of the Roman Empire, further progress or development seems to have ceased for quite a time. Eventu-

[1] Paper read at the monthly meeting on 3rd November 1936.

ally the monks established themselves in a number of well-known monasteries, and it is important to note that invariably fertile valleys and plains were chosen. It was not necessary to select a site which was strategical, because in these far-off times, monasteries were not subject to pillage or interference. In fact, right up to the time of Henry VIII., they enjoyed an uninterrupted period of progress so far as gardening was concerned. Many of the vegetables and plants which the Romans introduced survived and were perpetuated in our land, thanks to the painstaking care of the monks.

As one may imagine the monks set an example to the neighbouring peasants in the art of cultivation. The monasteries were not only centres of religion, healing and learning, but also of agriculture and horticulture.

So far as one can gather from records and old manuscripts, there was little difference in horticultural conditions as they existed in the fourteenth century compared with the period of the Roman occupation.

During the thirteenth century, England was often in the throes of civil wars, with the result that people lived on hills and inaccessible places, contrasted with the fertile valleys where the monks lived. The royal gardens were maintained, however, the kings of this period setting up arbours and ornamental fish ponds to please and amuse their queens.

By the early part of the fourteenth century, there were many fine and old-established orchards cultivated by the nobility. During this time a class was growing up of farmers who farmed lands, merely paying some yearly tribute in service or in kind to their overlord. Round these small farms and manors, gardens and orchards were planted. In the Middle Ages, a garden for beauty and pleasure was quite secondary in consideration to a kitchen garden which, on the one hand, supplied herbs for flavouring the meat enjoyed by the wealthy, and on the other supplied mundane fare for the poorer classes. We find references made to fennel, mint, parsley, onions, leeks and saffron. The latter was valued greatly. Cabbages are frequently mentioned. With regard to fruit, apples, pears, strawberries and cherries seem to have been cultivated very extensively. Gardens at this time were usually square enclosures, bounded either by walls of stone or brick or by thick hedges, with a view to

security. All the hedges and paths were kept neat and tidy. No garden was complete unless it had its nook or arbour. Water was obtained from a nearby cistern or, in some cases, from an elaborately ornamented fountain. What flowers were grown ? Violets, periwinkles, marigolds, scabious, poppy, roses and lilies, the latter probably being the yellow and purple iris. The rose was then as now a favourite flower—of course, the wild flowers, such as cowslips, daffodils, primroses, daisies and foxgloves would brighten up many dull corners.

The comparative peace which followed the Wars of the Roses had its influence on gardens. It was no longer necessary to confine them within castle walls. Houses were now built on low-lying ground and surrounded by a moat ; gardens were made eventually on both sides of the moat. An early innovation was the making of flower beds enclosed by low fences of trellis work. These railings remained in vogue for a long time and were used in the construction of the gardens at Hampton Court. Another novelty introduced at this time was topiary work, that is, quaintly cut trees and shrubs. This is an ancient art known to the Romans but not practised in England until the sixteenth century. To-day one of the finest remaining examples of this topiary work is at Levens Hall in Westmorland.

Resting places were arranged along garden walls in the form of shady nooks and corners, turfed seats and arbours with trellis covered with climbing plants.

At the beginning of the sixteenth century, a new flower bed was adopted, as well as the straight railed beds. This was a " knotted bed " or knot—flower beds laid out in curious and complicated geometrical patterns. The earth in the knots was either raised a little, being kept in its place by borders of bricks and tiles or was on the same level as the paths so that the divisions were made with box or thrift. The beds when planted looked rather like our carpet bedding. All kinds of flowers were used, such as acanthus, cowslips, daisies, hollyhocks, iris, lily of the valley, marigolds, pansies, poppies, roses, snapdragon, wallflowers, and such herbs as mint and marjoram.

With regard to the sixteenth century fruit garden I mentioned before that strawberries were grown, but it is not until now that raspberries are cultivated. Apricots are also mentioned, and there are two apricot trees in Berkshire which

still bear fruit. The trees are supposed to have been planted when the apricot was first introduced into this country. It cannot be proved that red currants were grown in gardens before this time. It was still only the large landowners who indulged in a garden specially set apart for flowers and pleasure. Other gardens were essentially for practical use.

The reign of Elizabeth was a golden era in English history, and abounded in men of genius in art, science and industry. Persecuted European Protestants took refuge in England and brought ideas to bear on gardening. The Elizabethan garden was the outcome of the older English fashions combined with new ideas from France, Italy and Holland. The result was a national style, although there were no sudden changes. The garden of this period was laid out strictly in connection with the house. The architect who designed the house designed the garden, too. In front of the house there was a terrace with smaller walks running parallel to the terrace. In between were grass plots, mazes, or knotted beds. The peculiar geometric tracery which surmounted so many Elizabethan houses found its counterpart in the design of the flower beds. Hedges were made of yew, box, cypress, privet, fruit trees, etc. Many of these were also trained to make sheltered shady arches over the pathways. In the gardens typical of this age, between the flower beds and at intervals along the terrace or beside the walks, lead or stone vases were placed, either for ornament or filled with flowers. Water effects were obtained by having fountains or trout streams.

Proof of the progress of gardening at the end of the fifteenth century is shown by the Charter given by King James I. to the Company of Gardeners of London. This Company was actually a guild of gardeners similar in composition and purpose to the craft guilds of former days.

The seventeenth century gardeners specially cultivated various herbs, chiefly for their medicinal properties. The most important introduction was the potato, supposed to have been brought to Europe by Sir Walter Raleigh from Virginia, but this is doubtful. Artichokes, melons, turnips, mustard, peas and beans were all grown for kitchen use. Orchards were extensive, and apples grown there were used for making cider and also, it is recorded, to make an ointment

" used to beautify the face." Quinces, plums, cherries, pears, apricots and peaches were cultivated.

The progress of science at this time is evidenced in the work of gardening, as ideas for protecting and sheltering delicate plants begin to appear, which later developed into orangeries and greenhouses, and finally into the using of hothouses and stoves. It is interesting to note that James I. made an attempt to promote mulberry culture with a view to establishing a silk industry. Mulberry trees were regularly imported from France.

The custom of strewing rushes on the floors was general in the Middle Ages. The houses of that time were made fragrant with herbs and flowers which were strewn on the floor and also placed in vases. Some flowers had a particular meaning attached to them, and were therefore worn on special occasions—a practice which has not altogether died out. For instance, a spray of rosemary was carried at funerals and also worn at marriages. Remember Ophelia saying, " There's rosemary, that's for remembrance." This period is noteworthy for the delight taken in growing flowers for domestic decoration.

The seventeenth century falls into three distinct divisions, namely, the reign of Charles I., the Commonwealth and the Restoration.

As in other professions, each succeeding generation of gardeners had a very poor opinion of the capabilities of their predecessors, while they thought the excellence of their own gardens could hardly be surpassed. (Is this true to-day ?)

During the reign of Charles I., orchards were improved by the practising of grafting and transplanting.

During the Commonwealth, gardening was treated from a more practical point of view. Profit and improvement of soil were considered. Utility was the only purpose of a garden considered, so flower gardens and garden design were rather neglected. Evelyn, the famous diarist, was a very keen gardener and compiled a detailed *Gardener's Almanac.*

The introduction of foreign tender plants led to the gradual growth of conservatories and hothouses. For example, hothouses were required for growing oranges. After the Restoration, conservatories were quite general. Gardeners at this

time seem to have understood that a certain amount of air was necessary for plant life, but had not yet realised the power of light. English gardeners studied the work of French ones and adopted many of their methods. Gardens designed at this time were modelled in the French style, which was very expensive, as it included long avenues with broad paths adorned with statues, fountains and cascades, trellis work, alcoves of clipped trees, waterfalls, in short, the formal garden. The prophet of this new school was the famous Le Notre, who evolved the wonders of Versailles and transformed most of the magnificent gardens in France. There is no definite proof that Le Notre came to England and directed the alterations made by Charles II. in Hampton Court and St James's Park, but it is probable that he was consulted by the English king and nobles on the laying out of their gardens.

One feature which was apparent in every garden of this date was the bowling green or alley. The pastime of bowls was even allowed within the precincts of some religious houses. Every garden also contained one or more sundials. They formed as a rule the centre of the design and were in themselves an appropriate ornament. The sundial has frequently survived destruction when all other traces of an old garden have been obliterated. On some dials, the owner's coat-of-arms was used to form the style or, on others, the motto of the family was inscribed round the dial, which data is often a help in fixing the year of their construction.

Gardeners from all times have had great difficulty to contend with in the keeping down of garden pests. Moles were among the chief pests, hence the appearance of the mole catcher, who was paid by the number of moles he caught. Many fanciful remedies for destroying garden pests were in vogue.

No survey of the garden would be complete without the mention of bees, whose hives were to be found in them all, and the arrangement of which was considered a necessary part of a gardener's duties.

During the reign of William and Mary, gardens with fountains were still in vogue. As might be expected, William introduced the Dutch type of garden into England. Gardens still had grassy walks and trim, clipped hedges, that is, they were still formal. At this time " parterres " were popular,

that is, simply variations of design in grass, beds of flowers in the pattern of scrolls or foliage. They were symmetrical in design. Between the parterres there were borders.

There are a few references made to town gardening at this time. They were laid out round about the larger town houses in the same manner as country gardens. Were there any parks ? St James's Park and Hyde Park added beauty to the country round London. This century is noteworthy for the frequent embellishment of gardens with lead and iron work. Lead vases and statues were still used as ornaments in the garden. But the fashion of formal gardening was beginning to wane, partly due to the fact that it was found to be unsuitable for very large gardens. As in literature there was a return to nature, which meant the appearance of landscape gardening. The change was gradual, however. At the time of Queen Anne, gardens were not strictly formal, as their long walks were between cut trees, which were not exactly hedges but trees clipped up to a certain height and allowed to feather naturally at the top.

Gardens now ceased to be merely enclosures, for they began to encroach on the surrounding park. This was a good thing, for it cast off some of the Dutch garden formality. Natural surroundings if used in the construction of a garden, helped to cut down the cost. But these ideas were for a time abused when, instead of a garden encroaching on a park, the park came up to the house and the flower garden nearly disappeared. People were tired of topiary work, so instead of cut hedges and arbours, gardens were overcrowded with a confusion of cut bushes. Gardens were becoming merged in the parks, fountains were done away with and avenues were extended.

New plants from America and other foreign lands continued to find their way to England, so hothouses were still required and were also improved. An important experiment took place at this time, namely, the forcing of vegetables. Previous to this, if any vegetable was required early or out of season, it was procured chiefly from Holland. This induced enterprising gardeners, early in the eighteenth century, to make attempts at forcing greens and salad, asparagus and cucumbers. Great strides in vegetable culture were therefore made.

Now that the formal garden was old-fashioned, designers did

not only lay out new gardens in the new style, but they freely destroyed and abused where they could not obliterate the work of former generations. The most important introduction at this time was the sunk fence. Fountains and straight canals were swept away or converted into miniature waterfalls, winding streams or artificial lakes. The name which stands out most conspicuously in connection with landscape gardening is that of Brown, or as he is known, " Capability Brown." Old gardens disappeared before his transforming influence. The management of water was considered his strong point, though he sometimes obtained it at the expense of, for instance, cutting down valuable trees to obtain a clear space. Terracing became very popular in all kinds of gardens.

By the end of the eighteenth century, landscape gardening was the recognised national style of England, and soon became the fashion on the Continent. But on the Continent, the green grass found in England was lacking. The flower garden again became important, and was no longer considered as part of the shrubbery.

The progress in gardening appears to have been somewhat slow up to and well into the nineteenth century. The pioneer plant hunters really did a lot to improve our gardens by introducing many new exotic plants. Here it is interesting to note that some of the most successful explorers were Edinburgh's sons—Fortune, Douglas and Jeffrey all helped to enrich our gardens and glasshouses.

Up to the nineteenth century, glasshouses were only the luxury of the rich, and this can be appreciated better when one recalls that glass was subject to taxation. The amount of tax was according to the size of the panes. This explains why some of the very old structures were glazed with numerous small panes. Evasion of taxes was always practised ! At this period the only means of artificial heating was by flues situated under the floors and in the walls of the glasshouses, which were nearly all of the lean-to pattern. In spite of this primitive method of generating heat, wonderful grapes, pineapples and peaches were produced, not to mention elaborately trained specimen stove and greenhouse plants. It was only really at the end of the nineteenth century that we were provided with carnations and chrysanthemums anything like the standard or quality of

our modern varieties. It was at this period that hybridisation was taken up in a serious way. Such wizards as Burbank and Le Moine did marvellous work in this direction.

The progress of gardening during the past few years has been so rapid that it is almost impossible to take even a cursory review of it in all its branches. The immense advance in botany and classification, the improved methods of cultivation, the vast hothouses and the countless treasures from abroad all combined to enhance the nineteenth century garden. Many flowers have become so familiar that it is hard to picture a garden without them, yet numbers of plants seen everywhere in 1900 had not been brought to Britain one hundred years before.

While the rage for landscape gardening was at its height, many skilful gardeners were busy in a quiet way carrying on the work of horticulture. The kitchen garden was removed from sight when possible, but fruit trees were still extensively cultivated. Pineapples were grown in all large gardens where hothouses were kept up, but this pine cultivation was both lengthy and costly.

During the nineteenth century, the work of collecting in all countries continued with unabated vigour, and it would be impossible to name all the botanists engaged in the work, or to remember half the plants which this country owes to them. For instance, the number of roses in our gardens now is infinite, but a large proportion only became known in this country during the last century. The roses in favour during the middle of the century inclined towards stiffness, and growers aimed at double, even circular blooms with sweet scent and strong colours. Again, numerous as orchids are to-day, they have nearly all been imported during the last sixty years.

The great advance in the world of science was none the less evident in the world of gardening where hybridisation and cross fertilisation were practised and understood with the result that the quantity of flowers available was greatly increased. The natural outcome of all this floral wealth was a complete change in the manner of gardening. In all big gardens the greenhouses were enlarged, and often one whole house was devoted to one kind of plant. These hothouses became so overstocked that a new method of showing off tender plants came into fashion, namely, "bedding out."

Round and square beds, diamond or octagon, were placed anyhow on the grass or in a circle or fan in front of the windows. Gardens in the pure landscape style which had practically ignored the existence of flowers were easily adapted to suit the new ideas. Ornamental shrubs were also on the increase, so a special shrubbery to show them off became a feature. New roses called for display, so a rosary became necessary. In a large number of gardens, the old herbaceous borders had been ejected when the landscape style became the rage, so that " bedding-out " did not actually displace existing flowers. Where new gardens were being laid out, the Italian style was chosen as being best suited to the new bedding system. It was not slavishly copied, but the main ideas, the terraces, flights of steps, fountains, balustrades and regular flower beds were retained. To produce vivid colouring seems to have been the chief aim for many years. The greater the blaze of flowers, the more was the garden admired.

The bringing back into the garden of the numerous hardy plants, which were banished and, in many cases, ruthlessly torn up and thrown away when " bedding-out " became the fashion, was the greatest improvement at the end of the nineteenth century.

It was about this time also that the rock garden was first developed. This was due to the fact that among the plants recently introduced were many whose natural place of growth was on mountains or between the crevices of stone. Therefore it was only reasonable to give these plants conditions as nearly alike as possible to their native conditions. The result was the formation of rock gardens.

Another development was sub-tropical gardening. Fine results were obtained from planting out the hardier tree ferns and palms during the summer. The wild garden also was popular.

Even into the twentieth century, we depended upon importations to fill our orchid houses. This has practically ceased. Almost every connoisseur of orchids now has his laboratory filled with test tubes containing myriads of little baby orchids, and the difficulty is to find space to rear the numerous offsprings. This branch of horticulture, like many others, owes much to science, which now plays a very important part in any garden.

PROCEEDINGS, ETC.,

OF THE

Royal Caledonian Horticultural Society

REPORT OF THE COUNCIL to the Annual General Meeting, on Wednesday, 13th January 1937.

Your Council has pleasure in submitting its report of the activities of the Society for 1936, which records satisfactory progress. The average attendance at the monthly meetings was 117, which is a decrease on the very high average of 160 obtained last year. The Council desire again to express their thanks to the lecturers in the past year, who helped to make the monthly meetings so interesting and instructive. The many beautiful floral displays by the trade and members at our monthly meetings has been appreciated, not only by the members themselves but by their friends. The Council hope that these monthly exhibitions will be continued throughout 1937. It is noted that the competitors of the monthly competitions are very few in number. This fact means that for monthly competitions, the entries are not as representative of the various districts as they might be, and your Council would like to see a larger number of competitors.

Two Shows were again held in 1936. The Autumn Show was held on 9th and 10th September, and the Council were very pleased with the result, in fact, it was another record-breaking Show. The number of exhibitors, competitors and entries equalled the record of 1935, and the attendance was the highest attained for several years. The opening ceremony was performed by Her Grace The Duchess of Roxburghe, in a most delightful and charming manner, and thereafter presented the principal prizes as follows :

Robert Fife Memorial Challenge Trophy, for Special Classes, open to affiliated Societies—Dunfermline Horticultural Society. This is a new Trophy, presented by Mr William Fife, the President, in memory of his father, the late Mr Robert Fife, an ex-President of the Society.

Blackmore & Langdon Challenge Trophy, for table of tuberous begonias—William M'Dowell, Catherine Lodge, Inveresk.

John Phillip Memorial Challenge Trophy, for six bowls of roses—Bannatyne & Jackson, Hamilton.

Irene Torrance Trophy, for an exhibit of cut dahlia flowers and any foliage—R. Grant, Bo'ness. This is a new Trophy which has been presented by Messrs Torrance & Hopkins, Busby.

Jubilee Challenge Cup, presented by Mr Kenneth C. Corsar, Edinburgh, to commemorate the Silver Jubilee, for sweet peas—W. Aitchison, Thurston Gardens, Innerwick.

Storrie Challenge Trophy, for hardy herbaceous perennials—W. Smith, The Gardens, Dunecht.

The Strathmore Challenge Trophy, for grapes—A. Brotherston, Tyninghame, Prestonkirk. This is a new Trophy, presented by the Earl and Countess of Strathmore.

Sharp Challenge Shield, for collection of vegetables in allotment and amateurs' section—J. A. Hardie, Galashiels.

Windolite Challenge Trophy, for the best exhibit in the Show—Dobbie & Co., Ltd., Edinburgh.

Under the auspices of the National Rose Society, there were again several classes of roses in our schedule.

Our Honorary President, The Countess of Minto, proposed a vote of thanks to Her Grace The Duchess of Roxburghe.

The Chrysanthemum Show was held on 26th and 27th November. Although we held it a week later than usual, the Show was a success from a floral point of view, but a failure financially. The number of exhibitors and competitors were practically the same as in 1935. Floral classes were down, but

there was an increase in fruit and vegetables. The Show was opened by The Lady Susan Gilmour, D.B.E., who, after making a most interesting speech, presented the Scottish Challenge Cup and Society's Gold Medal for Japanese chrysanthemums—R. Mackenzie, Dochfour Gardens, Inverness ; The Ichthemic Perpetual Challenge Trophy, for single and double chrysanthemums—H. Woolman, Shirley ; Cochrane Challenge Trophy, for Japanese chrysanthemums—Orr Watt, Whiting Bay Hotel, Arran ; Millgrove Challenge Trophy, for decorative chrysanthemums—J. C. Lyle, Inverkeithing ; The Young Challenge Cup, for perpetual flowering carnations—W. Aitchison, Innerwick ; The Scarlett Trophy, for best collection of vegetables, confined to amateurs and allotment holders—G. Patterson, Chirnside ; Goalen Cup, confined to amateurs in Edinburgh and Leith—J. Westwood, St Margaret's, Edinburgh. Owing to the lack of public support, the Council, after careful consideration, decided to discontinue the Chrysanthemum Show.

The Council desire to thank the stewards for their assistance at the Shows, and the Press for their very efficient reports.

The members of the Society, on the invitation of Mr Claude Allan, visited the gardens of Kilmahew Castle, Cardross, on 11th July. In spite of showery weather, the members had a most enjoyable afternoon examining the beautiful gardens. The members were afterwards entertained to tea by Mrs Allan.

An Excursion was made on 5th September to the Melville Nurseries of Messrs Dobbie & Co., Ltd. The weather on this occasion was more favourable, and the members and their friends spent a most interesting two hours in the Nurseries. The Directors of the Company very kindly gave tea to the large gathering.

The Society's representative on the Horticultural Advisory Committee of the Department of Agriculture for Scotland has reported to the Council as follows : " The Committee met three times during 1936 and, judging from the attendance of members from all over Scotland and the interest of the Department of Agriculture officials, the work accomplished has been of great value to horticulture.

" Further and more particular attention has been given to the work going on to combat strawberry diseases, and a scheme

for Inspection and Certification of healthy stocks inaugurated. There are great possibilities in this for the export of sound plants. Careful consideration was given to the position of small holdings ; imports duties ; diseases of tomatoes and leeks ; the growing of tobacco ; the position of growers with regard to Income Tax ; tomato marketing scheme ; new order with regard to imports of healthy plants ; rating and damage to crops by various extraneous circumstances.

" The quinquennial census of production of glass house and vegetable crops was taken, which it is hoped will provide statistical information definitely showing the great advance in horticultural pursuits."

The Affiliation Scheme is progressing favourably. Several Societies have become affiliated, and the Council hope that the scheme will assist smaller Societies in their activities.

An abstract of the accounts for the year has been circulated amongst the members.

The Syllabus of Lectures, etc., for next Session has also been circulated, and it is hoped that the meetings will continue to be well attended.

The Council desire to thank the members of the various Committees for their co-operation and assistance during 1936.

The following additions have been made to the membership roll during the year :

1 subscribing at £2, 2s. annually,
4 subscribing £1, 1s. annually,
46 subscribing 10s. 6d. annually,
71 subscribing 5s. annually.

On Behalf of the Council,

MAURICE G. KIDD,
Secretary.

AWARDS MADE BY THE SOCIETY IN 1936.

"David King" Medals are Awarded at Monthly Meetings.

Large Gold Medals.

Allwood Bros, Sussex, for carnations.

Austin & M'Aslan, Ltd., Glasgow, for gladioli, roses and sweet peas.

City Parks Department, Edinburgh, for begonias and chrysanthemums.

Dicksons & Co., Edinburgh, for roses and antirrhinums.

Dobbie & Co., Ltd., Edinburgh, for collection of gladioli, dahlias, etc.

Dobbie & Co., Ltd., Edinburgh, for potatoes, chrysanthemums and fruit trees.

Keeling & Sons, A. J., Bradford, for orchids.

M'Gredy & Sons, Portadown, Ireland, for roses.

Storrie, Thyne & Co., Ltd., Dundee, for hardy herbaceous plants, dahlias and fruit.

Sutton & Sons, Ltd., Reading, for vegetables.

Gold Medals.

Allwood Bros., Sussex, for carnations for garden and greenhouse.

Bannatyne & Jackson, Ltd., Hamilton, for dahlias and roses.

Bell, Fred. J., Whitley Bay, for pansy and viola blooms.

Bruce & Co., Ltd., Dalkeith, for chrysanthemums.

Daniel Bros., Ltd., Norwich, for montbretias, gladioli, etc.

Dicksons & Co., Edinburgh, for conifers, shrubs and fruit trees.

Dobbie & Co., Ltd., Edinburgh, for shrubs.

Downie, Ltd., John, Edinburgh, for rock garden and hardy fruit.

Englemann, Ltd., Essex, for cut carnation blooms.

Fairley, Jas., Cairneyhill, Fife, for roses, gladioli and chrysanthemums.

Forbes (Hawick), Ltd., Hawick, for hardy herbaceous, phloxes, pentstemons, dahlias, etc.

Greenyer Bros., Worthing, for chrysanthemums.

Laird & Dickson, Edinburgh, for rock plants and alpines.

Gold Medals.

Methven & Sons, Thos., Edinburgh, for bouquets, etc.
Oliver & Hunter, Moniaive, for colchicums, heather, etc.
Thomson & Sons, Wm., Clovenfords, for grapes and chrysanthemums.
Torrance & Hopkins, Busby, for chrysanthemums and dahlias.
Webster, Chas., Fochabers, for hardy fruit.
Woolman, H., Birmingham, for chrysanthemums.
Young & Thomson, Edinburgh, for ornamental gardens.

" David King " Gold Medal.

Dobbie & Co., Ltd., Edinburgh, for chrysanthemums, dahlias and gladioli.

Silver Gilt Medals.

Croll, Ltd., D. & W., Dundee, for roses and dahlias.
Ferguson & Sons, R. C., Dunfermline, for roses.
Jeffrey, Thos., Edinburgh, for Shrubs.
Lister & Son, Alex., Rothesay, for dahlias and roses.
London Road Nurseries, Kilmarnock, for shrubs.
Maxwell & Beale, Broadstone, for heath garden.
Methven & Sons, Thos., Edinburgh, for decorative exhibit.
Todd & Co., Edinburgh, for bouquets, etc.
Ward & Sons, Alex., Paisley, for chrysanthemums.
Young & Thomson, Edinburgh, for ornamental garden.

" David King " Silver Gilt Medals.

Bradley, Dr O. Charnock, Gifford, for Michaelmas daisies.
Corsar, K. C., Edinburgh, for auriculas.
Dicksons & Co., Edinburgh, for daffodils.
Dobbie & Co., Ltd., Edinburgh, for tulips and dahlias.
Dobbie & Co., Ltd., Edinburgh, for dahlias.

Silver Medals.

Aitken, Peter, Bathgate, for rock plants and alpines.
Aitken, Peter, Bathgate, for rock plants and alpines.
Carvel, W., Newton Mearns, for alpines.
Castlehill Nurseries, Kippen, for alpines.
Edrom Nurseries, Edrom, for alpines.

Forbes (Hawick), Ltd., Hawick, for geraniums.
Gibson & Co., G., Leeming Bar, Yorks, for Iceland poppies.
Hewitt & Co., Stratford-on-Avon, for delphiniums and herbaceous plants.
Laing, J., Hawick, for alpines, etc.
Mair & Sons, Geo., Prestwick, for gladioli.
Stewart, W. J., Lanark, for carnations.
Thomson, Fairbairn, Edinburgh, for shrubs.
Trotter, Colonel A. R., M.V.O., D.S.O., Mortonhall, for fruit.
Wells, Ben., Jun., Surrey, for herbaceous plants.

" David King " Silver Medals.

Armstrong, David, Gilmerton, for *Primula Malacoides* (varieties).
Dicksons & Co., Edinburgh, for flowering bulbs.
Dobbie & Co., Ltd., Edinburgh, for daffodils.
Eggo, D., Balerno, for cyclamen.
Innes, Alex., Edinburgh, for apples.

" David King " Bronze Medals.

Honeyman, J. T., Barnton, for schizanthus.

Bronze Medals.

Foxwells, Sussex, for antirrhinums.
Hannah, Andrew, Kilmarnock, for shrubs.
Thomson, Fairbairn, Edinburgh, for bulbs, etc.
Tillie, Whyte & Benvie, Edinburgh, for bulbs, etc.

Cultural Certificates.

Hart, W. J., Grey House Lodge, Edinburgh.

Awards of Merit.

Foxwell, Douglas, Sussex, for antirrhinum " Foxwell."
M'Gredy & Son, Samuel, Ireland, for " M'Gredy's Orange," " M'Gredy's Pride," and " Fred Walker."
Pattie, Ernest, Fife, for " Mrs Ernest Pattie."
Torrance & Hopkins, Busby, for " Janetta " (garden cactus).
Woolman, H., Birmingham, for " Jim Tomlinson."

PRIZEWINNERS AT MONTHLY COMPETITIONS IN 1936.

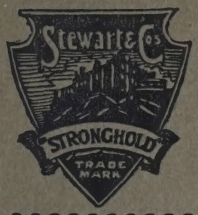
4th Feby.—One Bowl or Pot Tulips .	1. W. Swan, Edinburgh. 2. S. Suttie, Edinburgh.
3rd March—One Bowl or Pot Cyclamen	1. Wm. M'Dowell, Inveresk. 2. D. Eggo, Balerno.
One Bowl or Pot Hyacinths	1. N. Leyden, Lasswade. 2. S. Suttie, Edinburgh.
One Bowl or Pot Narcissi .	1. S. Suttie, Edinburgh. 2. J. Cessford, Davidson's Mains.
7th April—One Pot Cineraria . .	1. J. R. Nichol, Liberton. 2. S. Suttie, Edinburgh.
Two Pots Primula (any variety)	1. S. Forbes, Milton Bridge. 2. D. Armstrong, Gilmerton.
Two 6-inch Pans, Alpines .	1. Wm. Hart, Edinburgh.
8th May—One Pot Schizanthus . .	1. J. A. Sword, Cramond. 2. J. T. Honeyman, Barnton.
One Pot Plant . . .	1. J. A. Sword, Cramond. 2. S. Suttie, Edinburgh.
2nd June—Two Vases Cut Flowers .	1. D. Armstrong, Gilmerton. 2. S. Suttie, Edinburgh.
7th July—Two Vases Delphiniums .	1. S. Forbes, Milton Bridge. 2. W. Swan, Edinburgh.
Two Vases Roses, . .	1. S. Suttie, Edinburgh. 2. Wm. Hart, Edinburgh. 3. J. A. Sword, Cramond.
Two Vases Sweet Peas .	1. G. Miller, West Linton. 2. S. Suttie, Edinburgh.
2nd Sept.—Two Vases Herbaceous .	1. Wm. Hart, Edinburgh. 2. W. Cunningham, Edinr.
Two Vases Dahlias . .	1. R. G. Aitchison, Inveresk. 2. S. Suttie, Edinburgh.
6th Oct.—Two Vases Early Flowering Chrysanthemums	1. S. Suttie, Edinburgh. 2. W. Cunningham, Edinr.
Two Vases Michaelmas Daisies	1. N. Leyden, Lasswade. 2. Wm. Hart, Edinburgh.
3rd Nov.—Two Vases Decorative Chrysanthemums (disbudded)	1. J. Cessford, Davidson's Mains. 2. W. Cunningham, Edinr.

3rd Nov.—One Vase Incurved Chrysanthemums . . .	1. J. Cessford, Davidson's Mains.	
	2. W. Scott, Musselburgh.	
1st Dec.—One Vase Single Chrysanthemums (disbudded)	1. S. Suttie, Edinburgh.	
	2. J. R. Nichol, Liberton.	
	3. J. Cessford, Davidson's Mains.	
One Vase Chrysanthemums (any variety) . .	1. S. Suttie, Edinburgh.	

AFFILIATED SOCIETIES.

The Armadale Horticultural Society.
The Arniston Colliery, Gorebridge and District Horticultural and Industrial Association.
The Ayton Horticultural Society.
The Colinton Horticultural Society.
The Currie Parish Horticultural and Industrial Society.
The Dalmarnock Society.
The Dunfermline Horticultural Society.
The Department of Health for Scotland Horticultural Society.
The East Lothian Horticultural Society.
The East of Scotland Horticultural Society.
The Edinburgh Working Men's Flower Show and Industrial Society, Ltd.
The Falkirk Horticultural Society.
The Gifford Horticultural Society.
The Helensburgh and Gareloch Horticultural Society.
The Kelso Horticultural Society.
The Leith Flower Show and Industrial Society.
The Liberton Horticultural Association.
The Loanhead Horticultural Society.
The Melrose Association.
The Musselburgh Horticultural Society.
The Rosewell Horticultural Society.
The Roslin Society.
The St. Bernard's Allotment Society.
The St. Leonard's Garden Allotments Association.
The Scottish Rock Garden Club.
The Stirling and District Horticultural Society.
The Winchburgh and District Allotment Holders and Industrial Society.

Ask the Secretary for particulars and privileges of affiliation.



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